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A11100988460
/NBS monograph
QC100 .U556 V50-52;54-58;1962 C.1 NBS-PU

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NBS MONOGRAPH 50

Bibliography on Atomic Transition Probabilities

U.S. DEPARTMENT OF COMMERCE

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Bibliography on Atomic Transition Probabilities

B. M. Glennon and W. L. Wiese

National Bureau of Standards Monograph 50

Issued August 1, 1962

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington 25, D.C. - Price 35 cents

National Bureau of Standards
JUN 2 1965
130,265
QC100
.U556
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Bibliography on Atomic Transition Probabilities [1]

B. M. Glennon and W. L. Wiese

A bibliography on atomic transition probabilities is presented. The papers are arranged according to elements and stages of ionization, and the method employed and class of transitions are indicated behind each reference. Only articles on discrete transitions, both permitted and forbidden, are listed. Also included is a supplementary list of papers dealing with transition probabilities from a general point of view, a table showing the availability of numerical material on the individual atoms and ions, and a table of conversion factors.

1. Introduction

The numerical data on atomic transition probabilities are found widely scattered in the literature of the last 40 years, and the articles are often difficult to detect or quite inaccessible to the average user, as in the case of dissertations and technical reports. In view of the increasing need for these constants and the complexity of new calculations or experiments to determine them, it is imperative to assemble and make generally known all the material which is already available. The present collection is intended as a contribution to this end.

1.1. The NBS Data Center

In June 1960, a data center on atomic constants was established in the Atomic Physics Division of the National Bureau of Standards. The objectives of the center are to collect and catalog all relevant literature, to extract and analyze the numerical data, and to prepare and publish bibliographies and tables of "best" values. Work is in progress on collision cross sections and transition probabilities.

The collection of literature on transition probabilities was started by utilizing some recent survey articles. Branching out from these, all references and footnotes in the literature were scanned. Simultaneously, several abstracting journals were searched backwards through the year 1950 until a complete overlap with the available compilations was insured. Two card files ordered to authors and elements were established, and reprints of the articles were collected and cataloged. A large percentage of the articles are in languages other than English; translations are being made whenever the language skills of the data center group do not suffice for a critical evaluation. The literature collection is now completely up-to-date,[2] and the current literature including several abstracting journals is constantly being monitored.

1.2. Scope of this Collection

Since the public announcement of the data center in the summer of 1961, a large number of requests for bibliographies on individual elements have been received. It seems appropriate at this time to prepare a general bibliography, especially in view of the fact that the last two compilations by Kolesnikov and Leskov (Uspekhi Fiz. Nauk **65,** 3, 1958) and by van Regemorter (J. phys. radium **20,** 907, 1959) are now already 3 years old, and thus do not contain a number of important papers published since then. The increased activity in this field in the last few years is partly reflected in the greater number of papers accumulated in this collection, namely well over 600, as against 370 by Kolesnikov and Leskov (which also includes molecular transitions) and about 250 by van Regemorter. Another reason for the increased size of this collection is that emphasis was laid on a complete presentation of the literature without regard to the quality of the article or to the application. Therefore, all of the early work was included. In many instances this is superseded by more refined determinations, but in cases where nothing else is available this older material is still very valuable for applications where a rough estimate will do. For the first 10 elements, for which a critical evaluation of the numerical data is under way, all work superseded by more refined determinations or considered not reliable is marked by an asterisk.

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[1] This research is a part of project DEFENDER, sponsored by the Advanced Research Projects Agency, Department of Defense, through the Office of Naval Research.

[2] A few requests for theses, etc., are still outstanding.

The bibliography is restricted to atomic and ionic transition probabilities of discrete transitions, including permitted (electric dipole) as well as forbidden (magnetic dipole, electric quadrupole) lines. The "*f*-values" for bound-free and free-free transitions are collected by another group of the data center under absorption cross sections, and the literature may be requested there (Atomic Constants Data Center—Collision Cross Sections).

1.3. Availability of Atomic Transition Probabilities

The availability of transition probabilities for the individual elements is shown in column 4 of table 1. It is seen that for some of the 92 natural elements no material is available. For many other elements data exist only for the neutral atom and the first stage of ionization. Furthermore, the number of transitions treated is often quite small, and sometimes only the *f*-values for the resonance line or for forbidden lines are available. The latter case is indicated in the table by a subscript "*f*" following the stage of ionization.

Fortunately, the available literature is supplemented by a few general treatments:

a. The Coulomb Approximation by D. R. Bates and A. Damgaard

Bates and Damgaard (Phil. Trans. Roy. Soc. London, Ser. A, **242,** 101, 1949) have shown there that the main contribution to the transition integral comes from a region in which the departure of the potential of an atom or ion from its asymptotic form is so small that it may be replaced by the latter. This enables them to derive a general analytical expression for the transition integral and to compile tables (for *s–p, p–d, d–f* transitions). From these the transition probabilities for any atom or ion can immediately be calculated, provided that the lower and upper energy levels of the transitions are known (for certain other restrictions see their article). Comparison of this method with other theoretical and experimental results shows that for simple atoms, i.e., those with one electron outside closed shells, the agreement is very good (with deviations usually smaller than 10 percent). Also, for many of the more complex atomic systems, especially in lighter elements, fair agreement is obtained.

Following the development of the Coulomb approximation a number of publications, especially in the astrophysical literature, contained numerical evaluations of a few transition probabilities using this method. None of these are included in this collection, except a few articles that contain a large amount of calculated values (more than 10 multiplets per stage of ionization). It is probably less time consuming and safer to evaluate the *f*-values rather than to look up articles in the hope of finding just the particular transitions. Secondly, very few of the authors state the applicability of the Coulomb approximation for the individual lines, i.e., the degree of interference in the transition integral, etc., providing thereby incomplete information anyway.

b. The Screening Approximation by D. Layzer and C. M. Varsavsky

This theoretical approach was recently developed by D. Layzer (Ann. Phys. **8,** 271, 1959) and applied to a large number of transitions by C. M. Varsavsky (Thesis, Harvard, 1958; and Astrophys. J. Suppl. Ser. **6,** No. 53, 75–108, 1961). The method makes use of wave functions expanded explicitly in powers of the nuclear charge; consequently it is especially suitable for the simultaneous treatment of all elements in an isoelectronic sequence. In its simplest form, the approximation is based on screened hydrogenic functions. The results do not always agree well with values obtained from other methods; however, further refinements of the theory are planned. All elements treated in Varsavsky's second, more comprehensive paper (1961) are listed in column 6 of table 1. In this article all transition probabilities are for lines in the vacuum ultraviolet.

c. "Experimental Transition Probabilities for Spectral Lines of Seventy Elements" by C. H. Corliss and W. R. Bozman (National Bureau of Standards Monograph 53, 1962)

Recently Meggers, Corliss, and Scribner have published tables of spectral line intensities for 39,000 lines of 70 elements in the wavelength range from 2000–9000A.[3] They determined the intensities photographically from the spectra emitted by a free-burning d-c arc with copper electrodes, into which 0.1 atomic percent of each element was mixed. In this way approximately uniform conditions for all elements were obtained. The temperature of the arc was determined by comparing the measured intensities with known relative *f*-values. This could be done for 20 elements and good agreement was obtained, indicating the general consistency of the data. The derived *f*-values are being published in an NBS Monograph, "Experimental Transition Probabilities for Spectral Lines of Seventy Elements," by C. H. Corliss and W. R. Bozman. Although errors in the absolute values as large as factors of 2 do not seem to be unreasonable, this work should be valuable for all applications where high accuracy is not required. The availability of this material is presented in table 1, column 5.

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[3] "Tables of Spectral Line Intensities," by W. F. Meggers, C. H. Corliss, and B. F. Scribner, National Bureau of Standards Monograph 32, October 1961.

d. Two Comprehensive Papers on Forbidden Lines

Among the many papers on calculations of *f*-values for forbidden lines are two that treat a large number of atoms and ions in which certain configurations occur. These comprehensive articles are not included in the element list in order to keep the size of this compilation compact. Instead, they are listed in table 1, column 7 (A. M. Naqvi, Thesis Harvard, 1951) and column 8 (S. Pasternack, Astrophys. J. **92,** 129, 1940).

1.4. Arrangement of the Bibliography

The bibliography is divided into two parts. The first part (section 3.1) contains all papers which deal with the subject of atomic transition probabilities from a general point of view. The articles are arranged according to the following subjects:

A. Tables of numerical values
B. Previous literature compilations
C. Review articles
D. Fundamental relationships and basic concepts
E. Detailed descriptions of experimental or theoretical methods
F. General comments
G. Environmental influences on transition probabilities.

Short explanatory remarks are given whenever it was felt necessary. In part 2 all literature containing numerical values on the individual elements is compiled except the articles listed in table 1. It is arranged according to elements, these being listed in alphabetical order by their chemical symbol. Within the elements, the degrees of ionization serve as subdivisions, and the papers are listed in chronological order. Thus, for looking up *f*-value literature one should preferably start from the end of the list and work backward when the more recent work is exhausted.

For the abbreviations of the journals the designations in the "List of Periodicals" of Chemical Abstracts (1956 and Supplements) have been adopted and should be consulted when in doubt. For convenience, a list of abbreviations for the lesser known journals encountered here is attached at the end of this collection. Particular attention should be given to the apparent differences in the designation of some Russian journals. For instance, articles from the "Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki" available only in the Russian language are listed as "Zhur. Eksptl. i Teoret. Fiz." If they have been or are being translated privately for the data center, the word "translated" is added in parentheses (transl.). Since 1958 the more important Russian literature has been translated by the American Institute of Physics and other institutions. The translated versions are quoted. In this example the abbreviation is "Soviet Phys.—JETP."

A number of Russian workers have published their articles in Russian journals and also translated in German journals (e.g., Prokof'ev, V. K., Z. Physik **57,** 387 (1929) and Prokof'ev, V. K., Zhur. Eksptl. i Teoret. Fiz. **1,** 123 (1931) for Na I). In these cases a remark indicating this is added in parentheses behind the designation. The same is done when a dissertation, besides being published in full, is put into a journal in a condensed form or when, in addition to a paper, talks on the same subject are recorded in conference proceedings.

Under the column "classification" each article is characterized by one or more code words which indicate the method being used and the class of transitions being investigated, i.e., permitted—electric dipole—lines (nothing added) or forbidden—electric quadrupole, magnetic dipole—lines ("forb." added). The word relative ("rel.") appears in all cases where only relative transition probabilities are given. Explanations for the code words are given in table 2.

1.5. Future Plans

It is intended to publish additions or revised editions of this bibliography whenever significant amounts of new literature are accumulated. The ultimate goal of the data center is the publication of tables containing "best" numerical values of transition probabilities. Work on this project is in progress, and the material on the lightest 10 elements should be evaluated by the end of this year. However, the preparation of numerical data for all elements must be considered as a long-range program because of the enormous amount of work involved. It is our hope, that in the meantime the present bibliography may be of assistance to all interested scientists.

We express our sincere thanks to Dr. R. Hefferlin, who assisted effectively in getting this collection started, and who keeps a very keen interest in the progress of the center, and to Mary Lake and Berry Cobb, who did most of the tedious initial literature search. Melvin W. Smith participated in the final setup of this bibliography and offered many helpful suggestions.

We further thank all those who have generously furnished us with reprints, copies of dissertations, and technical reports. Our special thanks are due to Prof. Minnaert, Utrecht, and Prof. W. Lochte-Holtgreven, Kiel.

1.6. Table 1.—Availability of Atomic Transition Probabilities

Element	Symbol	Z	A. General availability of data		B. Contents of comprehensive papers (included in (4) but not in the element list)		
			Stage of ionization [1]	Additional values by Corliss and Bozman [2] (not included in (4)). Stage of ionization	Varsavsky [3] (vacuum u.v. lines). Stage of ionization	Naqvi [4] (forbidden lines). Stage of ionization	Pasternack [5] (forbidden lines). Stage of ionization
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Hydrogen	H	1	I				
Helium	He	2	I II		I		
Lithium	Li	3	I II	I(7)*	I II		
Beryllium	Be	4	I II III	I(17) II(2)	I . . . III	I	
Boron	B	5	I II III IV	I(4)	I . . . IV	I II	
Carbon	C	6	I II III IV V	I(1)	I . . . V	I . . . III	I
Nitrogen	N	7	I II III IV V VI		I . . . VI	I . . . IV	I II
Oxygen	O	8	I II III IV V VI VII		I . . . VII	I . . . V	I . . . III
Fluorine	F	9	I II III IV V VI VII		I . . . VII	I . . . VI	II . . . IV
Neon	Ne	10	I II III IV V VI VII VIII IX		II . . . VIII	II . . . VII	III . . . V
Sodium	Na	11	I II III IV V VI VII VIII IX	I(12)	I III . . . IX	III . . . VIII	IV . . . VI
Magnesium	Mg	12	I II IV V VI VII VIII IX X	I(19) II(6)	I II IV . . . X	I IV . . . IX	V . . . VII
Aluminum	Al	13	I II III V VI VII VIII IX X XI	I(16)	I . . . III V . . . XI	I II V . . . X	VI . . . VIII
Silicon	Si	14	I II III IV VI VII VIII IX X XI XII	I(15)	I . . . IV VI . . . XII	I . . . III VI . . . XI	I VII VIII
Phosphorus	P	15	I II III IV V VII VIII IX X XI XII XIII	I(9)	I . . . V VII . . . XIII	I . . . IV VII . . . XII	I II
Sulfur	S	16	I II III IV V VI VIII IX X XI XII XIII$_f$		I . . . VI VIII . . . XII	I . . . V VIII . . . XIII	I . . . III
Chlorine	Cl	17	I II III IV V VI VII IX X XI XII XIII XIV$_f$		I . . . VII IX . . . XIII	I . . . VI IX . . . XIV	II . . . IV
Argon	Ar	18	I II III IV V VI VII VIII X XI XII XIII XIV XV$_f$		II . . . VIII X . . . XIV	II . . . VII X . . . XV	III . . . V
Potassium	K	19	I III IV V VI VII VIII IX XI XII XIII XIV XV XVI$_f$	I(8)	III . . . IX XI . . . XIV	III . . . VIII XI . . . XVI	IV . . . VI
Calcium	Ca	20	I II IV V VI VII VIII IX X XII XIII XIV XV XVI$_f$ XVII$_f$	I(69) II(10)	IV . . . X XII . . . XV	IV . . . IX XII . . . XVII	V . . . VII
Scandium	Sc	21	I II V VI VII VIII IX X XI	I(230) II(81)	V . . . XI	V . . . X	VI VII
Titanium	Ti	22	I II VI VII VIII IX X XI XII	I(707) II(178)	VI . . . XII	VI . . . XI	VII
Vanadium	V	23	I II VII VIII IX X XI XII XIII	I(795) II(219)	VII . . . XIII	VII . . . XII	VIII
Chromium	Cr	24	I II IV$_f$ VIII IX X XI XII XIII XIV	I(615) II(177)	VIII . . . XIV	VIII . . . XIII	IV IX
Manganese	Mn	25	I II V$_f$ IX X XI XII XIII XIV XV	I(290) II(54)	IX . . . XV	IX . . . XIV	V X
Iron	Fe	26	I II III IV$_f$ V$_f$ VI$_f$ VII$_f$ X XI XII XIII XIV XV XVI	I(671) II(80)	X . . . XVI	X . . . XV	VI VII XI
Cobalt	Co	27	I XI XII XIII XIV XV XVI XVII	I(602) II(57)	XI . . . XVII	XI . . . XVI	
Nickel	Ni	28	I II III$_f$ XII XIII XIV XV XVI$_f$ XVII XVIII	I(242) II(4)	XII . . . XV XVII XVIII	XII . . . XVI	
Copper	Cu	29	I XIX	I(46) II(10)	XIX		
Zinc	Zn	30	I II	I(18) II(2)			
Gallium	Ga	31	I	I(15)			
Germanium	Ge	32		I(43)			
Arsenic	As	33		I(25)			
Selenium	Se	34	II	I(5)			
Bromine	Br	35					
Krypton	Kr	36	I III$_f$				
Rubidium	Rb	37	I II	I(13)			
Strontium	Sr	38	I II	I(67) II(9)			
Yttrium	Y	39	I II	I(260) II(110)			
Zirconium	Zr	40	I II	I(700) II(322)			
Niobium	Nb	41		I(1062) II(314)			
Molybdenum	Mo	42	I	I(1258) II(208)			
Technetium	Tc	43					
Ruthenium	Ru	44	I	I(915) II(52)			
Rhodium	Rh	45		I(434) II(25)			
Palladium	Pd	46		I(76) II(4)			
Silver	Ag	47	I	I(11) II(4)			
Cadmium	Cd	48	I II	I(20) II(4)			
Indium	In	49	I	I(21) II(1)			
Tin	Sn	50	I	I(59)			
Antimony	Sb	51		I(53)			
Tellurium	Te	52		I(12)			
Iodine	I	53	I II				
Xenon	Xe	54	I II$_f$ III$_f$				
Cesium	Cs	55	I	I(19)			
Barium	Ba	56	I II	I(79) II(16)			
Lanthanum	La	57	II	I(270) II(272)			
Cerium	Ce	58		II(1349)			
Praseodymium	Pr	59		II(232)			
Neodymium	Nd	60		I(80) II(275)			

Element	Symbol	Z	A. General availability of data		B. Contents of comprehensive papers (included in (4) but not in the element list)		
			Stage of ionization [1]	Additional values by Corliss and Bozman [2] (not included in (4)). Stage of ionization	Varsavsky [3] (vacuum u.v. lines). Stage of ionization	Naqvi [4] (forbidden lines). Stage of ionization	Pasternack [5] (forbidden lines). Stage of ionization
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Promethium	Pm	61					
Samarium	Sm	62		I(221) II(780)			
Europium	Eu	63		I(298) II(149)			
Gadolinium	Gd	64		I(520) II(581)			
Terbium	Tb	65		I(3)			
Dysprosium	Dy	66		II(86)			
Holmium	Ho	67		I(3)			
Erbium	Er	68		II(78)			
Thulium	Tm	69		I(62) II(157)			
Ytterbium	Yb	70		I(53) II(281)			
Lutetium	Lu	71		I(82) II(81)			
Hafnium	Hf	72		I(433) II(309)			
Tantalum	Ta	73		I(789) II(288)			
Tungsten	W	74		I(1045) II(108)			
Rhenium	Re	75		I(824) II(48)			
Osmium	Os	76		I(912) II(35)			
Iridium	Ir	77		I(511)			
Platinum	Pt	78		I(161) II(1)			
Gold	Au	79	I	I(26)			
Mercury	Hg	80	I II III IV	I(19)			
Thallium	Tl	81	I	I(18)			
Lead	Pb	82	I	I(38) II(1)			
Bismuth	Bi	83	I	I(32)			
Polonium	Po	84					
Astatine	At	85					
Radon	Rn	86	II_f				
Francium	Fr	87					
Radium	Ra	88					
Actinium	Ac	89					
Thorium	Th	90		I(342) II(789)			
Protactinium	Pa	91					
Uranium	U	92		I(326) II(316)			

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[1] The stage of ionization is indicated by a Roman numeral (I=neutral atom, II=first ion, etc.). A subscript "*f*" after the ion indicates that only data on forbidden lines are available. Hydrogen-like ions are generally not included in the bibliography. For relations to hydrogen see section 2 (Conversion Factors).

[2] Corliss, C. H., and Bozman, W. R., National Bureau of Standards Monograph 53 (1962): "Experimental Transition Probabilities for Spectral Lines of Seventy Elements." (See section 1.3 for discussion.)

[3] Varsavsky, C. M., Astrophys. J. Suppl. Ser. **6**, No. 53, 75 (1961).

[4] Naqvi, A. M., Thesis Harvard (1951).

[5] Pasternack, S., Astrophys. J. **92**, 129 (1940); Publ. Astron. Soc. Pacific **51**, 160 (1939). (The latter is superseded by the former.)

*The Arabic number indicates the number of lines measured.

1.7. Table 2.—Classification of Articles

Except where "rel." (relative) appears, all determinations in the papers listed give absolute values.

A. Theoretical methods:
  1. SCF—self-consistent field calculations
  2. CA—Coulomb approximation
  3. Quant.—other quantum mechanical calculations
  4. Quant. forb.—quantum mechanical calculations for forbidden lines
  5. Estim.—estimations from sum rules, etc.

B. Experimental methods:
  1. Canal—canal ray experiments
  2. Emiss.—measurement in emission (arc, furnace, discharge tube, etc.)
  3. Absorpt.—measurement in absorption (King furnace, absorption tube, etc.)
  4. Life—direct lifetime measurements
  5. Hook—anomalous dispersion measurements
  6. Misc.—miscellaneous experimental methods (magneto-rotation, polarization, magnetic resonance, astrophysical measurements, etc.)

C. Miscellaneous:
  1. Comm.—comments, additions, or corrections to other articles, methods, etc.
  2. Incompl.—article not yet classified (because translation is needed, incomplete information available, etc.)
  3. Compil.—compilations

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2. Conversion Factors

The numerical factors relating the quantities A_{ki}, f_{ik}, and S are given in table 3, where:

A_{ki} is the transition probability for spontaneous emission (sec^{-1}).

f_{ik} is the absorption oscillator strength (dimensionless).

S is the line strength in atomic units, which are:

for electric dipole transitions (allowed—denoted by E_d):

$$a_0^2e^2=6.459_4\times10^{-36}\ \text{cm}^2\ \text{esu}^2;$$

for electric quadrupole transitions (forbidden—denoted by E_q):

$$a_0^4e^2=1.808_8\times10^{-52}\ \text{cm}^4\ \text{esu}^2;$$

for magnetic dipole transitions (forbidden—denoted by M_d):

$$e^2h^2/16\pi^2m_e^2c^2=8.599\times10^{-41}\ \text{erg}^2\ \text{gauss}^{-2}.$$

The wavelength λ is given in Angstrom units.

g is the statistical weight.

The factor in each square converts by multiplication the quantity above it into the one at its left. The upper energy level of a transition is denoted by the subscript k, the lower by i. The initial state is written first, i.e., i first means absorption.

Besides the quantities introduced above, the following are also in use and are related to them by:

1. Transition probability of absorption B_{ik}

$$B_{ik}=6.01\lambda^3\frac{g_k}{g_i}A_{ki};$$

2. Transition probability of induced emission B_{ki}

$$B_{ki}=6.01\lambda^3A_{ki};$$

3. Emission oscillator strength f_{ki}

$$f_{ki}=-\frac{g_i}{g_k}f_{ik}.$$

Finally, it should be noted that the line strength S is symmetrical:

$$S=S_{ik}=S_{ki}.$$

TABLE 3.—*Conversion factors*

	A_{ki}	f_{ik}	S
A_{ki}	1	$\frac{6.670_2\times10^{15}}{\lambda^2}\frac{g_i}{g_k}$	E_d $\frac{2.026_1\times10^{18}}{g_k\lambda^3}$ E_q $\frac{1.679_8\times10^{18}}{g_k\lambda^5}$ M_d $\frac{2.697_2\times10^{13}}{g_k\lambda^3}$
f_{ik}	$1.4992\times10^{-16}\lambda^2\frac{g_k}{g_i}$	1	E_d $\frac{303.7_5}{g_i\lambda}$ E_q $\frac{251.8}{g_i\lambda^3}$ M_d $\frac{4.043_6\times10^{-3}}{g_i\lambda}$
S	E_d $4.935_6\times10^{-19}g_k\lambda^3$ E_q $5.953\times10^{-19}g_k\lambda^5$ M_d $3.707_6\times10^{-14}g_k\lambda^3$	E_d $3.292_1\times10^{-3}g_i\lambda$ E_q $3.971\times10^{-3}g_i\lambda^3$ M_d $247.3_0g_i\lambda$	1

Since hydrogen-like ions (with one electron and nuclear charge Z) have intensity quantities which are simply related to hydrogen, papers dealing with these ions are not included in the bibliography. For convenience, the relations are given below:

$$f_Z=f_H \qquad S_Z=Z^{-2}S_H \qquad A_Z=Z^4A_H.$$

References for Section 2

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Maecker, H.	Z. Physik 135, 13-22 (1953).	emiss.
Yilmaz, H.	Phys. Rev. 100, 1148-1153 (1955).	quant. forb.
Bolotin, A. B., Levinson, I. B. & Levin, L. I.	Soviet Phys. - JETP 2, 391-395 (1956).	quant.
Richter, J.	Z. Physik 151, 114-123 (1958).	emiss.
*Varsavsky, C. M.	Thesis Harvard (1958).	quant.
Goldberg, L., Müller, E. A. & Aller, L. H.	Astrophys. J. Suppl. Ser. 5, #45, 1-137 (1960).	CA
Doherty, L. R.	Thesis Michigan (1961).	emiss.
Foster, E. W.	Proc. Phys. Soc. London A 79, 94-104 (1962).	emiss.
	C II	
Aller, L. H.	Astrophys. J. 97, 135-165 (1943).	quant.
Biermann, L. & Lübeck, K.	Z. Astrophys. 25, 325-339 (1948).	SCF
Bolotin, A. B. & Yutsis, A. P.	Zhur. Eksptl. i Teoret. Fiz. 24, 537-543 (1953) (transl.).	SCF
Maecker, H.	Z. Physik 135, 13-22 (1953).	emiss.
*Varsavsky, C. M.	Thesis Harvard (1958).	quant.
Aller, L. H. & Jugaku, J.	Astrophys. J. Suppl. Ser. 4, #38, 109-156 (1959).	CA
Gaustad, J. E. & Spitzer, Jr., L.	Astrophys. J. 134, 771-776 (1961).	comm. & estim.
	C III	
Aller, L. H.	Astrophys. J. 97, 135-165 (1943).	quant.
Veselov, M. G.	Zhur. Eksptl. i Teoret. Fiz. 19, 959-964 (1949) (ATS transl.).	quant.
Bolotin, A. B. & Yutsis, A. P.	Zhur. Eksptl. i Teoret. Fiz. 24, 537-543 (1953) (transl.).	SCF
Veselov, M. G.	Vestnik Leningrad Univ. Ser. Fiz. i Khim. No. 8, 181-185 (1953) (transl.).	quant.
Gaustad, J. E. & Spitzer, Jr., L.	Astrophys. J. 134, 771-776 (1961).	estim.
	C IV	
Aller, L. H.	Astrophys. J. 97, 135-165 (1943).	quant.
Veselov, M. G.	Zhur. Eksptl. i Teoret. Fiz. 19, 959-964 (1949) (ATS transl.).	quant.

C V

AUTHOR	JOURNAL	CLASSIFICATION
Veselov, M. G.	Zhur. Eksptl. i Teoret. Fiz. 19, 959-964 (1949) (ATS transl.).	quant.
Veselov, M. G.	Vestnik Leningrad Univ. Ser. Fiz. i Khim. No. 8, 181-185 (1953) (transl.).	quant.

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AUTHOR	JOURNAL	CLASSIFICATION
Frerichs, R.	Z. Physik 31, 305-310 (1925).	emiss., rel.
Kerschbaum, H.	Ann. Physik 83, 287-295 (1927).	canal
Russell, H. N.	Astrophys. J. 78, 239-297 (1927).	estim.
Prokof'ev, V. K.	Z. Physik 50, 701-715 (1928). [Same as Zhur. Eksptl. i Teoret. Fiz. 1, 111-122 (1931).]	hook, rel.
Menzel, D. H.	Publ. Lick Observatory 17, 232-238 (1930).	comm. & estim.
Prokof'ev, V. K.	Zhur. Eksptl. i Teoret. Fiz. 1, 111-122 (1931) (transl.). [Same as Z. Physik 50, 701-715 (1928).]	hook, rel.
Filippov, A. & Kremenevsky, N.	Physik. Z. Sowjetunion 1, 299-301 (1932).	hook, rel.
Chamalaun, F. J.	Thesis Utrecht (1934).	emiss., rel. & quant., rel.
Steinhäuser, A.	Z. Physik 95, 669-686 (1935) (see also below).	misc.
Steinhäuser, A.	Z. Physik 99, 300 (1936).	comm.
Katz, E. & Ornstein, L. S.	Physica 4, 757-760 (1937).	emiss., rel.
Hartree, D. R. & Hartree, W.	Proc. Roy. Soc. London A 164, 167-191 (1938).	SCF
King, G. W. & van Vleck, J. H.	Phys. Rev. 56, 464-465 (1939).	quant. forb., rel.
Schuttevaer, J. W.	Thesis Utrecht (1942) (see below for results).	emiss., rel.
Schuttevaer, J. W., de Bont, M. J. & van den Broek, Th. H.	Physica 10, 544-552 (1943).	emiss., rel.
Bates, D. R. & Damgaard, A.	Phil. Trans. Roy. Soc. London. Ser. A. 242, 101-122 (1949).	SCF
Trefftz, E.	Z. Astrophys. 29, 287-303 (1951).	SCF
Olsen, K. H., Routly, P. M. & King, R. B.	Proceedings of the National Science Foundation Conference on Stellar Atmospheres, Indiana Univ., p. 46 (1954).	absorpt., rel.
Olsen, K. H.	Thesis California Institute of Technology (1956). [See Olsen, K. H., et al., Astrophys. J. 130, 688-692 (1959) for results.]	absorpt.
Allen, C. W.	Monthly Notices Roy. Astron. Soc. 117, 622-628 (1957).	emiss. & CA
Vainshtein, L. A.	Optika i Spektroskopiya 3, 313-321 (1957) (transl.).	incompl.
Ostrovskii, Yu. I., Penkin, N. P. & Shabanova, L. N.	Bull. Acad. Sci. U.S.S.R. Phys. Ser. 22, 720-724 (1958) (results same as below). [See also Ostrovskii, Yu. I. & Penkin, N. P., Optics and Spectroscopy (U.S.S.R.) 11, 307-309 (1961).]	hook
Ostrovskii, Yu. I., Penkin, N. P. & Shabanova, L. N.	Soviet Phys. - Doklady 3, 538-540 (1958) (results same as above). [See also Ostrovskii, Yu. I. & Penkin, N. P., Optics and Spectroscopy (U.S.S.R.) 11, 307-309 (1961).]	hook
Varsavsky, C. M.	Thesis Harvard (1958).	quant.
Addink, N. W. H.	Spectrochim. Acta 15, 349-359 (1959).	emiss.
Olsen, K. H., Routly, P. M. & King, R. B.	Astrophys. J. 130, 688-692 (1959).	absorpt.
Boyarchuk, M. E. & Boyarchuk, A. A.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 234-256 (1960) (transl.).	comm.
Goldberg, L., Müller, E. A. & Aller, L. H.	Astrophys. J. Suppl. Ser. 5, #45, 1-137 (1960).	CA
Ostrovskii, Yu. I. & Penkin, N. P.	Optics and Spectroscopy (U.S.S.R.) 10, 219-222 (1961) (see also below).	hook, rel.
Ostrovskii, Yu. I. & Penkin, N P.	Optics and Spectroscopy (U.S.S.R.) 11, 307-309 (1961).	hook & comm.

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AUTHOR	JOURNAL	CLASSIFICATION
Milne, M. E.	Monthly Notices Roy. Astron. Soc. 84, 354-363 (1924).	misc.
Russell, H. N.	Astrophys. J. 78, 239-297 (1927).	estim.
Zwaan, A.	Naturwissenschaften 17, 121-122 (1928).	quant.
Gerasimovic, B. P. & Struve, O.	Astrophys. J. 69, 7-33 (1929).	misc. & comm.
Zwaan, A.	Thesis Utrecht (1929) (same as below).	quant.
Zwaan, A.	Arch. nèerl. sci. 3 A 12, 1-75 (1929) (same as above).	quant.
Menzel, D. H.	Publ. Lick Observatory 17, 232-238 (1930).	comm. & estim.
Hartree, D. R. & Hartree, W.	Proc. Roy. Soc. London A 164, 167-191 (1938).	SCF
Bates, D. R. & Damgaard, A.	Phil. Trans. Roy. Soc. London. Ser. A. 242, 101-122 (1949).	SCF
Green, L. C. & Weber, N. E.	Astrophys. J. 111, 582-586 (1950).	SCF
Green, L. C., Weber, N. E. & Krawitz, E.	Astrophys. J. 113, 690-696 (1951). [See also Astron. J. 56, 38 (1951-1952).]	SCF
Osterbrock, D. E.	Astrophys. J. 114, 469-472 (1951).	quant. forb.
Seaton, M. J.	Proc. Roy. Soc. London A 208, 418-430 (1951).	comm.
Green, L. C., Weber, N. E. & Krawitz, E.	Astron. J. 56, 38 (1951-1952).	SCF & comm.
Trefftz, E. & Biermann, L.	Z. Astrophys. 30, 275-281 (1952).	SCF
Nikitin, A. A.	Doklady Akad. Nauk S.S.S.R. 98, 31-33 (1954) (transl.).	incompl.
Nikitin, A. A. & Gordienko, G. V.	Doklady Akad. Nauk Armyan. S.S.R. 20, 165-167 (1955) (transl.).	incompl.
Nikonova, E. I. & Prokof'ev, V. K.	Optika i Spektroskopiya 1, 290-297 (1956) (transl.).	hook, rel.
Bersuker, I. B.	Soviet Phys. - Doklady 2, 167-169 (1957).	SCF & estim.
Dvornikova, I. U. & Nagibina, I. M.	Optika i Spektroskopiya 4, 421-429 (1958).	incompl.
Nagibina, I. M.	Bull. Acad. Sci. U.S.S.R. Phys. Ser. 22, 678-679 (1958).	emiss., rel.
Nagibina, I. M.	Optika i Spektroskopiya 4, 430-437 (1958) (transl.).	incompl.
Varsavsky, C. M.	Thesis Harvard (1958).	quant.
Houziaux, L. & Sadoine, M. P.	Bull. soc. roy. sci. Liège 30, 287-299 (1961).	CA
Korolev, F. A. & Kvaratskheli, Yu. K.	Optics and Spectroscopy (U.S.S.R.) 10, 200-202 (1961).	emiss., rel.
Ostrovskii, Yu. I. & Penkin, N. P.	Optics and Spectroscopy (U.S.S.R.) 10, 3-6 (1961) (see also below).	hook
Ostrovskii, Yu. I. & Penkin, N. P.	Optics and Spectroscopy (U.S.S.R.) 11, 307-309 (1961).	comm.
Douglas, A. S. & Garstang, R. H.	Submitted for publication, Proc. Cambridge Phil. Soc. (1962).	SCF

Ca VII

AUTHOR	JOURNAL	CLASSIFICATION
Osterbrock, D. E.	Astrophys. J. 114, 469-472 (1951).	quant. forb.

Ca XII

AUTHOR	JOURNAL	CLASSIFICATION
Edlén, B.	Z. Astrophys. 22, 30-64 (1942).	quant. forb.
Huang, K.	Astrophys. J. 101, 187-195 (1945).	misc. forb.

Ca XIII

AUTHOR	JOURNAL	CLASSIFICATION
Edlén, B.	Z. Astrophys. 22, 30-64 (1942).	quant. forb.
Huang, K.	Astrophys. J. 101, 187-195 (1945).	misc. forb.
Garstang, R. H.	Astrophys. J. 115, 569-570 (1952).	quant. forb.

Ca XV

AUTHOR	JOURNAL	CLASSIFICATION
Edlén, B.	Z. Astrophys. 22, 30-64 (1942).	quant. forb.
Garstang, R. H.	Astrophys. J. 115, 569-570 (1952).	quant. forb.
Garstang, R. H.	Proc. Cambridge Phil. Soc. 52, 107-113 (1956).	quant. forb.

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AUTHOR	JOURNAL	CLASSIFICATION
Kuhn, W.	Naturwissenschaften 14, 48-49 (1926) (see also below).	misc.
Kuhn, W.	Kgl. Danske Videnskab. Selskab Mat.-fys. Medd. 7, 1-86 (1926).	misc.
Soleillet, P.	Compt. rend. 187, 212-214 (1928).	misc.
Ellett, A.	Phys. Rev. 33, 124 (1929).	misc.
Larche, K.	Z. Physik 67, 440-477 (1931).	misc., rel.
Zemansky, M. W.	Z. Physik 72, 587-599 (1931).	absorpt.
Filippov, A. N.	Trudy Gosudarst. Opt. Inst. Leningrad 8, #77, 1-8 (1932) (transl.) (same as below).	hook, rel.
Filippov, A. N.	Physik. Z. Sowjetunion 1, 289-296 (1932) (same as above).	hook, rel.
Koenig, H. D. & Ellett, A.	Phys. Rev. 39, 576-584 (1932).	life
Mitchell, A. C. G.	Phys. Rev. 43, 887-893 (1933).	comm.
Soleillet, P.	Compt. rend. 196, 1991-1993 (1933).	misc.
Ornstein, L. S., van Hengstum, J. P. A. & Brinkman, H.	Physica 5, 145-152 (1938).	emiss., rel.
King, G. W. & van Vleck, J. H.	Phys. Rev. 56, 464-465 (1939).	quant. forb., rel.
King, R. B. & Stockbarger, D. C.	Astrophys. J. 91, 488-502 (1940).	absorpt.
Schuttevaer, J. W., de Bont, M. J. & van den Broek, Th. H.	Physlca 10, 544-552 (1943).	emiss., rel.
Webb, H. W. & Messenger, H. A.	Phys. Rev. 66, 77-86 (1944).	life
Vainshtein, L. A. & Yavorskil, B. M.	Doklady Akad. Nauk S.S.S.R. 87, 919-922 (1952) (transl.).	incompl.
Matland, C. G.	Phys. Rev. 91, 436 (1953).	life
Vainshtein, L. A. & Yavorskil, B. M.	Zhur. Eksptl. i Teoret. Fiz. 27, 712-718 (1954) (SLA transl. RT-3363).	quant.
van Hengstum, J. P. A.	Thesis Utrecht (1955) (see below for results).	emiss.
van Hengstum, J. P. A. & Smit, J. A.	Physica 22, 86-98 (1956).	emiss.
Vainshtein, L. A.	Optika i Spektroskopiya 3, 313-321 (1957) (transl.).	incompl.
Les, Z. & Niewodniczanskl, H.	Acta Phys. Polon. 17, 365-368 (1958).	emiss., rel.
Nagibina, I. M.	Optlka i Spektroskopiya 4, 430-437 (1958) (transl.).	incompl.
Addink, N. W. H.	Spectrochim. Acta 15, 349-359 (1959).	emiss.
Geneux, E. & Wanders-Vincenz, B.	Helv. Phys. Acta 33, 185-220 (1960) (transl.).	misc.
Penkin, N. P. & Red'ko, T. P.	Optics and Spectroscopy (U.S.S.R.) 9, 360 (1960).	hook, rel. & emiss., rel.
Barrat, J. P. & Butaux, J.	Compt. rend. 253, 2668-2670 (1961).	misc.

Cd II

AUTHOR	JOURNAL	CLASSIFICATION
Geneux, E. & Wanders-Vincenz, B.	Helv. Phys. Acta 33, 185-220 (1960) (transl.).	misc.

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Cl I

AUTHOR	JOURNAL	CLASSIFICATION
Hey, P.	Z. Physik 157, 79-88 (1959).	emiss.

Cl II

AUTHOR	JOURNAL	CLASSIFICATION
Osterbrock, D. E.	Astrophys. J. 114, 469-472 (1951).	quant. forb.
Hey, P.	Z. Physik 157, 79-88 (1959).	emiss.
Gaustad, J. E. & Spitzer, Jr., L.	Astrophys. J. 134, 771-776 (1961).	estim.

Cl III

Gaustad, J. E. & Spitzer, Jr., L.	Astrophys. J. 134, 771-776 (1961).	estim.

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Co I

Bouma, T.	Thesis Utrecht (1930) (see below for results).	emiss., rel.
Ornstein, L. S. & Bouma, T.	Phys. Rev. 36, 679-693 (1930).	emiss., rel.
King, R. B., Parnes, B. R., Davis, M. H. & Olsen, K. H.	J. Opt. Soc. Am. 45, 350-353 (1955).	absorpt., rel.
Allen, C. W. & Asaad, A. S.	Monthly Notices Roy. Astron. Soc. 117, 36-49 (1957).	emiss.
Hinnov, E. & Kohn, H.	J. Opt. Soc. Am. 47, 156-162 (1957).	emiss.
Ostrovskii, Yu. I. & Penkin, N. P.	Optika i Spektroskopiya 5, 345-353 (1958) (transl.).	hook, rel.
Varsavsky, C. M.	Thesis Harvard (1958).	quant.
Addink, N. W. H.	Spectrochim. Acta 15, 349-359 (1959).	emiss.
Allen, C. W.	Monthly Notices Roy. Astron. Soc. 121, 299-332 (1960).	comm. & CA

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Frerichs, R.	Z. Physik 31, 305-310 (1925).	emiss., rel.
Frerichs, R.	Ann. Physik 81, 807-845 (1926).	emiss., rel.
Allen, J. S. V. & Hesthal, C. E.	Phys. Rev. 47, 926-931 (1935).	emiss., rel.
Rozhestvenskii, D. S. & Penkin, N. P.	Izvest. Akad. Nauk S.S.S.R. Ser. Fiz. 5, 97-101 (1941) (transl.).	hook, rel.
Rozhestvenskii, D. S. & Penkin, N. P.	J. Phys. (U.S.S.R.) 5, 319-337 (1941).	hook, rel. & comm.
Penkin, N. P.	Zhur. Eksptl. i Teoret. Fiz. 17, 355-365 (1947) (transl.).	hook, rel.
Wilson, O. C.	Astrophys. J. 107, 126-150 (1948).	misc., rel.
Estabrook, F. B.	Thesis California Institute of Technology (1950). [See Astrophys. J. 113, 684-689 (1951) for results.]	absorpt.
Hill, A. J.	Thesis California Institute of Technology (1950). [See Hill, A. J. & King, R. B., J. Opt. Soc. Am. 41, 315-321 (1951) for results.]	absorpt., rel.
Estabrook, F. B.	Astrophys. J. 113, 684-689 (1951). [See also ibid. 115, 571-572 (1952).]	absorpt.
Hill, A. J. & King, R. B.	J. Opt. Soc. Am. 41, 315-321 (1951).	absorpt., rel.
Huldt, L. & Lagerqvist, A.	Arkiv Fysik 5, 91-95 (1951). [Results same as J. Opt. Soc. Am. 42, 142 (1952).]	emiss.
Estabrook, F. B.	Astrophys. J. 115, 571-572 (1952).	comm.
Huldt, L. & Lagerqvist, A.	J. Opt. Soc. Am. 42, 142 (1952). [Results same as Arkiv Fysik 5, 91-95 (1951).]	emiss.
Davis, M. H., Routly, P. M. & King, R. B.	Proceedings of the National Science Foundation Conference on Stellar Atmospheres, Indiana Univ. 47-49 (1954).	absorpt.

AUTHOR	JOURNAL	CLASSIFICATION
Mitrofanova, L. A.	Pulkovo. Astronomicheskaia observatoriia. Izvestiia 19, #152, 100-102 (1954) (transl.).	emiss., rel.
Bell, G. D.	Thesis California Institute of Technology (1956-1957).	absorpt.
Nikonova, E. I. & Prokof'ev, V. K.	Optika i Spektroskopiya 1, 290-297 (1956) (transl.).	hook, rel.
Allen, C. W. & Asaad, A. S.	Monthly Notices Roy. Astron. Soc. 117, 36-49 (1957).	emiss.
Hinnov, E. & Kohn, H.	J. Opt. Soc. Am. 47, 156-162 (1957).	emiss.
Ostrovskii, Yu. I. & Penkin, N. P.	Optika i Spektroskopiya 3, 193-201 (1957) (transl.).	hook
Dvornikova, I. U. & Nagibina, I. M.	Optika i Spektroskopiya 4, 421-429 (1958).	incompl.
Addink, N. W. H.	Spectrochim. Acta 15, 349-359 (1959).	emiss.
Allen, C. W.	Monthly Notices Roy. Astron. Soc. 121, 299-332 (1960).	comm. & CA
Boyarchuk, M. E. & Boyarchuk, A. A.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 234-256 (1960) (transl.).	comm.
Wilkerson, T. D.	Thesis Michigan (1961).	emiss.

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AUTHOR	JOURNAL	CLASSIFICATION
Allen, J. S. V. & Hesthal, C. E.	Phys. Rev. 47, 926-931 (1935).	emiss., rel.
Penkin, N. P.	Zhur. Eksptl. i Teoret. Fiz. 17, 1114-1121 (1947) (transl.).	hook, rel.
Wilson, O. C.	Astrophys. J. 107, 126-150 (1948).	misc., rel.
Zagorianskaya, E. U.	Zhur. Eksptl. i Teoret. Fiz. 19, 447-450 (1949) (transl.).	incompl.
Aller, L. H., Hazen, M., Doherty, L., Grant, G., Jugaku, J., Spiegel, E. & Waddell, J.	Publications of the Observatory, Univ. of Michigan (Feb. 19, 1954).	misc., rel.
Boyarchuk, M. E. & Boyarchuk, A. A.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 234-256 (1960) (transl.).	comm.
Groth, H. G.	Z. Astrophys. 51, 231-285 (1961).	misc.
Wilkerson, T. D.	Thesis Michigan (1961).	emiss.

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AUTHOR	JOURNAL	CLASSIFICATION
Füchtbauer, C. & Hofmann, W.	Ann. Physik 43, 96-134 (1914).	absorpt., rel.
Füchtbauer, C.	Physik. Z. 21, 322-324 (1920).	absorpt.
Füchtbauer, C. & Joos, G.	Physik. Z. 23, 73-80 (1922).	absorpt.
Tolman, R. C.	Phys. Rev. 23, 693-709 (1924).	comm.
Bleeker, C. E.	Thesis Utrecht (1928).	emiss., rel.
Prokof'ev, V. K.	Z. Physik 57, 387-393 (1929). [Same as Zhur. Eksptl. i Teoret. Fiz. 1, 123-127 (1931).]	hook forb., rel.
Waibel, F.	Z. Physik 53, 459-482 (1929).	absorpt.
Minkowski, R. & Mühlenbruch, W.	Z. Physik 63, 198-209 (1930).	misc.
Muto, T.	Proc. Phys.-Math. Soc. Japan 12, 93-100 (1930).	quant.
Schütz, W.	Z. Physik 64, 682-696 (1930).	absorpt., rel.
Prokof'ev, V. K.	Zhur. Eksptl. i Teoret. Fiz. 1, 123-127 (1931) (transl.). [Same as Z. Physik 57, 387-393 (1929).]	hook forb., rel.
Filippov, A. N.	Zhur. Eksptl. i Teoret. Fiz. 2, 24-41 (1932) (transl.).	hook, rel.
Ornstein, L. S. & Key, J.	Physica 1, 945-952 (1934).	comm., rel.
Prokof'ev, V. K. & Shtandel, G.	Zhur. Eksptl. i Teoret. Fiz. 4, 359-367 (1934) (transl.).	hook, rel.
Heierman, J. H.	Thesis Utrecht (1937).	emiss.
Key, J.	Thesis Utrecht (1937).	emiss., rel.

AUTHOR	JOURNAL	CLASSIFICATION
Kvater, G. S. & Meister, T. G.	Vestnik Leningrad Univ. Ser. Fiz. i Khim. 7, 137-158 (1952) (transl.).	hook
Althoff, K.	Z. Physik 141, 33-42 (1955).	misc.
Bersuker, I. B.	Soviet Phys. - Doklady 2, 167-169 (1957).	estim.
Vainshtein, L. A.	Optika i Spektroskopiya 3, 313-321 (1957) (transl.).	incompl.
Archambault, Y., Descoubes, J., Priou, M., Omont, A. & Pebay-Peyroula, J.	J. phys. radium 21, 677-679 (1959).	misc.
Hawkins, W. B.	Phys. Rev. 123, 544-547 (1961).	quant.
Heavens, O. S.	J. Opt. Soc. Am. 51, 1058-1061 (1961).	CA
Naqvi, A. M.	Geophysics Corporation of America Technical Report 61-21-A; ASTIA Document 263 459 (1961).	CA

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Cu I

van Lingen, D.	Thesis Utrecht (1936) (see below for results).	emiss., rel.
van Lingen, D.	Physica 3, 977-994 (1936).	emiss., rel.
King, R. B. & Stockbarger, D. C.	Astrophys. J. 91, 488-502 (1940). [See also Bell, G. D., Astrophys. J. 127, 775-796 (1958).]	absorpt.
Schuttevaer, J. W., de Bont, M. J. & van den Broek, Th. H.	Physica 10, 544-552 (1943).	emiss., rel.
van den Bold, H. J.	Thesis Utrecht (1945).	emiss., rel.
Davis, M. H., Routly, P. M. & King, R. B.	Proceedings of the National Science Foundation Conference on Stellar Atmospheres, Indiana Univ., 47-49 (1954).	absorpt.
Parchevskii, G. F. & Penkin, N. P.	Soviet Phys. - JETP 1, 382-384 (1955).	hook, rel.
Bell, G. D.	Thesis California Institute of Technology (1956-1957). [See Bell, G. D., et al., Astrophys. J. 127, 775-796 (1958) for results.]	absorpt.
Allen, C. W. & Asaad, A. S.	Monthly Notices Roy. Astron. Soc. 117, 36-49 (1957).	emiss.
Bell, G. D.	Astron. J. 62, 7 (1957). [See Bell, G. D., et al., Astrophys. J. 127, 775-796 (1958) for results.]	comm.
Ostrovskii, Yu. I. & Penkin, N. P.	Optika i Spektroskopiya 3, 193-201 (1957) (transl.).	hook
Bell, G. D., Davis, M. H., King, R. B. & Routly, P. M.	Astrophys. J. 127, 775-796 (1958).	absorpt.
Varsavsky, C. M.	Thesis Harvard (1958).	quant.
Addink, N. W. H.	Spectrochim. Acta 15, 349-359 (1959).	emiss.
Vidale, G. L.	Technical Information Series Report R60SD331, General Electric Co., Space Science Laboratory (1960).	absorpt.

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Garstang, R. H.	Monthly Notices Roy. Astron. Soc. 111, 115-124 (1951).	quant. forb.
Yilmaz, H.	Phys. Rev. 100, 1148-1153 (1955).	quant. forb.
Bolotin, A. B., Levinson, I. B. & Levin, L. I.	Soviet Phys. - JETP 2, 391-395 (1956).	quant.

F V

Bolotin, A. B. & Yutsis, A. P.	Zhur. Eksptl. i Teoret. Fiz. 24, 537-543 (1953) (transl.).	SCF

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van Milaan, J. B.	Z. Physik 34, 921-923 (1925).	emiss., rel.
Frerichs, R.	Ann. Physik 81, 807-845 (1926).	emiss., rel.
van Milaan, J. B.	Thesis Utrecht (1926) (see below for results).	emiss., rel.
van Milaan, J. B.	Z. Physik 38, 427-439 (1926).	emiss., rel.
Russell, H. N.	Astrophys. J. 78, 239-297 (1927).	estim.
Allen, C. W.	Monthly Notices Roy. Astron. Soc. 96, 145-148 (1935).	emiss.
King, R. B. & King, A. S.	Astrophys. J. 82, 377-395 (1935). [See also Menzel, D. H. & Goldberg, L., Astrophys. J. 85, 40-41 (1936) and King, R. B. & King, A. S., Astrophys. J. 87, 24-39 (1938).]	absorpt., rel.
van Driel, H.	Thesis Utrecht (1935).	emiss., rel.
Menzel, D. H. & Goldberg, L.	Astrophys. J. 85, 40-41 (1936).	comm.
King, R. B. & King, A. S.	Astrophys. J. 87, 24-39 (1938).	absorpt., rel.
Rozhestvenskii, D. S. & Penkin, N. P.	Izvest. Akad. Nauk S.S.S.R. Ser. Fiz. 5, 97-101 (1941) (transl.) (see also below).	hook, rel.
Rozhestvenskii, D. S. & Penkin, N. P.	J. Phys. (U.S.S.R.) 5, 319-337 (1941).	hook, rel. & comm.
King, R. B.	Astrophys. J. 95, 78-81 (1942).	absorpt.
Sobolev, N. N.	Zhur. Eksptl. i Teoret. Fiz. 13, 131-136 (1943) (transl.).	emiss., rel.
Petrie, W.	Can. J. Research A 25, 42-48 (1947).	comm.
Gottschalk, W. M.	Astrophys. J. 108, 326-337 (1948).	quant., rel.
Carter, W. W.	Thesis California Institute of Technology (1949) (see below for results).	emiss., rel.
Carter, W. W.	Phys. Rev. 76, 962-966 (1949).	emiss., rel.
Crosswhite, H. M.	Spectrochim. Acta 4, 122-151 (1950).	emiss., rel.
Kopfermann, H. & Wessel, G.	Z. Physik 130, 100-108 (1951).	absorpt.
Mitrofanova, L. A.	Pulkovo. Astronomicheskaia observatoriia. Izvestiia 19, #149, 81-139 (1952) (transl.).	emiss., rel.
Aarts, J., Harting, D. & Bakker, C. J.	Physica 20, 1250-1258 (1954).	emiss., rel.
Parchevski, G. F. & Penkin, N. P.	Bull. Acad. Sci. U.S.S.R. Phys. Ser. 19, 4-5 (1955).	comm.
Bell, G. D.	Thesis California Institute of Technology (1956-1957). [See Bell, G. D., et al., Astrophys. J. 127, 775-796 (1958) for results.]	absorpt.
Osberghaus, O. & Ziock, K.	Z. Naturforsch. 11a, 762-763 (1956). [See also Ziock, K., Z. Physik 147, 99-112 (1957).]	life
Allen, C. W. & Asaad, A. S.	Monthly Notices Roy. Astron. Soc. 117, 36-49 (1957).	emiss.
Bell, G. D.	Astron. J. 62, 7 (1957). [See Bell, G. D., et al., Astrophys. J. 127, 775-796 (1958) for results.]	comm.
Hinnov, E. & Kohn, H.	J. Opt. Soc. Am. 47, 156-162 (1957).	emiss.
Ziock, K.	Z. Physik 147, 99-112 (1957). [See also Ottinger, C. & Ziock, K., Z. Naturforsch. 16a, 720 (1961).]	life
Bell, G. D., Davis, M. H., King, R. B. & Routly, P. M.	Astrophys. J. 127, 775-796 (1958).	absorpt.
Crosswhite, H. M.	Johns Hopkins Spectroscopic Report No. 13 (1958).	compil.
Mel'nikov, O. A.	Pulkovo. Astronomicheskaia observatoriia. Izvestiia 20, #6, 28-43 (1958) (transl.).	incompl.
Nagibina, I. M.	Bull. Acad. Sci. U.S.S.R. Phys. Ser. 22, 678-679 (1958).	emiss., rel.
Nagibina, I. M.	Optika i Spektroskopiya 4, 430-437 (1958) (transl.).	incompl.
Addink, N. W. H.	Spectrochim. Acta 15, 349-359 (1959).	emiss.
Hefferlin, R.	J. Opt. Soc. Am. 49, 680-685 (1959) (see also below).	emiss., rel.
Hefferlin, R.	J. Opt. Soc. Am. 49, 948-949 (1959). [See also Leftus, V., Central Astronomical Institutes of Czechoslovakia: Bulletin 12, 161-167 (1961).]	emiss., rel.
Zwaan, A.	Bulletin Astronomical Institutes Netherlands 14, 288-298 (1959).	misc., rel.
Allen, C. W.	Monthly Notices Roy. Astron. Soc. 121, 299-332 (1960).	comm. & CA

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Boyarchuk, M. E. & Boyarchuk, A. A.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 234-256 (1960) (transl.).	comm.
Belousova, I. M. & Gurevich, D. B.	Optics and Spectroscopy (U.S.S.R.) 10, 206-207 (1961).	comm.
Korolev, F. A. & Kvaratskheli, Yu. K.	Optics and Spectroscopy (U.S.S.R.) 10, 200-202 (1961).	emiss., rel.
Leftus, V.	Central Astronomical Institutes of Czechoslovakia: Bulletin 12, 161-167 (1961).	emiss. & comm.
Leftus, V.	J. Opt. Soc. Am. 51, 1151 (1961) (see also above).	comm.
Ottinger, C. & Zlock, K.	Z. Naturforsch. 16a, 720 (1961).	life
Jefferies, J. T. & Orrall, F. Q.	Astrophys. J. 135, 109-121 (1962).	estim.

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Clarkson, W.	Phil. Mag. 7, 98-105 (1929).	emiss., rel.
Rubinowicz, A.	Z. Physik 65, 662-676 (1930).	quant., rel.
Sobolev, N. N.	Zhur. Eksptl. i Teoret. Fiz. 13, 131-136 (1943) (transl.).	emiss., rel.
Crosswhite, H. M.	Spectrochim. Acta 4, 122-151 (1950).	emiss., rel.
Mitrofanova, L. A.	Pulkovo. Astronomicheskaia observatoriia. Izvestiia 19, #151, 45-48 (1953).	emiss., rel.
Aller, L. H., Hazen, M. Doherty, L., Grant, G., Jugaku, J., Spiegel, E. & Waddell, J.	Publications of the Observatory, Univ. of Michigan (Feb. 19, 1954).	misc., rel.
Mel'nikov, O. A.	Soviet Astronomy - AJ 3, 381-388 (1959).	misc. & misc. forb., rel.
Boyarchuk, M. E. & Boyarchuk, A. A.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 234-256 (1960) (transl.).	comm.
Groth, H. G.	Z. Astrophys. 51, 231-285 (1961).	misc.

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Garstang, R. H.	Monthly Notices Roy. Astron. Soc. 117, 393-405 (1957).	quant. forb.
Gaustad, J. E. & Spitzer, Jr., L.	Astrophys. J. 134, 771-776 (1961).	estim.

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Garstang, R. H.	Monthly Notices Roy. Astron. Soc. 117, 393-405 (1957).	quant. forb.

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Edlén, B.	Z. Astrophys. 22, 30-64 (1942).	quant. forb.
Huang, K.	Astrophys. J. 101, 187-195 (1945).	misc. forb.
Pecker, C.	Compt. rend. 250, 3779-3781 (1960).	misc.
Garstang, R. H.	Submitted for publication, Ann. astrophys. (1962).	comm.

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AUTHOR	JOURNAL	CLASSIFICATION
Edlén, B.	Z. Astrophys. 22, 30-64 (1942).	quant. forb.
Huang, K.	Astrophys. J. 101, 187-195 (1945).	misc. forb.

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AUTHOR	JOURNAL	CLASSIFICATION
Edlén, B.	Z. Astrophys. 22, 30-64 (1942).	quant. forb.
Huang, K.	Astrophys. J. 101, 187-195 (1945).	misc. forb.

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AUTHOR	JOURNAL	CLASSIFICATION
Edlén, B.	Z. Astrophys. 22, 30-64 (1942).	quant. forb.
Huang, K.	Astrophys. J. 101, 187-195 (1945).	misc. forb.
Gold, M. T.	Monthly Notices Roy. Astron. Soc. 109, 471-477 (1949).	SCF
Froese, C.	Monthly Notices Roy. Astron. Soc. 117, 615-621 (1957).	SCF
Garstang, R. H.	Submitted for publication, Ann. astrophys. (1962).	quant. forb.

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AUTHOR	JOURNAL	CLASSIFICATION
Edlén, B.	Z. Astrophys. 22, 30-64 (1942).	quant. forb.
Osterbrock, D. E.	Astrophys. J. 114, 469-472 (1951).	quant. forb.
Blaha, M.	Central Astronomical Institutes of Czechoslovakia: Bulletin 8, 34-37 (1957).	quant. forb.

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AUTHOR	JOURNAL	CLASSIFICATION
Allen, C. W.	Monthly Notices Roy. Astron. Soc. 117, 622-628 (1957).	comm.
Allen, C. W. & Asaad, A. S.	Monthly Notices Roy. Astron. Soc. 117, 36-49 (1957) (see also above).	emiss.
Ostrovskii, Yu. I. & Penkin, N. P.	Optika i Spektroskopiya 4, 719-724 (1958) (transl.) (results same as below).	hook
Ostrovskii, Yu. I., Penkin, N. P. & Shabanova, L. N.	Bull. Acad. Sci. U.S.S.R. Phys. Ser. 22, 720-724 (1958) (results same as above).	hook
Brehm, B., Demtröder, W. & Osberghaus, O.	Z. Naturforsch. 16a, 843 (1961). [See also Demtröder, W., below and Z. Physik 166, 42-45 (1962).]	life
Demtröder, W.	Thesis Bonn (1961). [See Z. Physik 166, 42-45 (1962) for results.]	life
Hanus, W.	Bull. acad. polon. sci. Classe 3, 8, 629-636 (1961).	comm.
Ottinger, C. & Zlock, K.	Z. Naturforsch. 16a, 720 (1961).	life
Demtröder, W.	Z. Physik 166, 42-45 (1962).	life

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*Hoyt, F. C.	Phil. Mag. 47, 826-831 (1924).	quant., rel.
*Slack, F. G.	Phys. Rev. 28, 1-12 (1926).	life
*Crew, W. H. & Hulburt, E. O.	Phys. Rev. 29, 843-847 (1927).	emiss., rel.
*Russell, H. N.	Astrophys. J. 78, 239-297 (1927).	estim.
Sugiura, M. Y.	J. phys. radium 8, 113-124 (1927). [See also Science Papers of the Institute of Physical and Chemical Research 11, 1-80 (1929).]	quant.
*Wien, W.	Münch. tierärztl. Wochschr. 89-91 (1927).	canal

AUTHOR	JOURNAL	CLASSIFICATION
*Carst, A. & Ladenburg, R.	Z. Physik 48, 192-204 (1928).	hook, rel.
*Kupper, A.	Ann. Physik 86, 511-529 (1928).	quant.
*Slack, F. G.	Phys. Rev. 31, 527-532 (1928).	quant.
*Snoek, J. L. & Ornstein, L. S.	Z. Physik 50, 600-608 (1928).	absorpt., rel.
Sugiura, Y.	Science Papers of the Institute of Physical and Chemical Research 11, 1-80 (1929).	quant.
*Menzel, D. H.	Publ. Lick Observatory 17, 232-238 (1930).	comm. & estim.
Stevenson, A. F.	Proc. Roy. Soc. London A 128, 591-599 (1930).	quant. forb.
*Maxwell, L. R.	Phys. Rev. 38, 1664-1686 (1931).	comm.
*Griffiths, J. H. E.	Proc. Roy. Soc. London A 147, 547-554 (1934).	life
*Woolley, R.	Monthly Notices Roy. Astron. Soc. 95, 101-116 (1934).	compil.
Menzel, D. H. & Pekeris, C. L.	Monthly Notices Roy. Astron. Soc. 96, 77-111 (1935).	quant.
*Rudnick, P.	Phys. Rev. 48, 807-811 (1935).	quant.
Breit, G. & Teller, E.	Astrophys. J. 91, 215-238 (1940).	quant. forb.
Biermann, L.	Physik. Z. 44, 232-233 (1943).	quant.
*Veselov, M. G.	Zhur. Eksptl. i Teoret. Fiz. 19, 959-964 (1949) (ATS transl.).	quant.
Wild, J. P.	Astrophys. J. 115, 206-221 (1952).	quant.
Harriman, J. M.	Phys. Rev. 101, 594-598 (1956).	quant.
Bethe, H. A. & Salpeter, E. E.	"Quantum Mechanics of One and Two Electron Atoms" (Academic Press, New York, 1957).	compil.
Green, L. C., Rush, P. P. & Chandler, C. D.	Astrophys. J. Suppl. Ser. 3, 37-50 (1957).	quant.
Fite, W. L., Brackmann, R. T., Hummer, D. G. & Stebbings, R. F.	Phys. Rev. 116, 363-367 (1959).	life forb.
Shapiro, J. & Breit, G.	Phys. Rev. 113, 179-181 (1959).	quant. forb.
Demidov, V. P.	Astronomicheskii Zhurnal 38, 1065-1068 (1961).	quant. forb.
Herdan, R. & Hughes, T. P.	Astrophys. J. 133, 294-298 (1961) (see also below).	quant.
Herdan, R. & Hughes, T. P.	Astrophys. J. 134, 1028 (1961).	comm.
Karzas, W. J. & Latter, R.	Astrophys. J. Suppl. Ser. 6, 167-212 (1961).	quant.

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*Russell, H. N.	Astrophys. J. 78, 239-297 (1927).	estim.
*Levy, S.	Z. Physik 72, 578-586 (1931).	hook, rel.
Vinti, J. P.	Phys. Rev. 42, 632-640 (1932).	quant.
Wheeler, J. A.	Phys. Rev. 43, 258-263 (1933).	quant.
Korwein, H.	Z. Physik 91, 1-36 (1934).	quant.
Hylleraas, E. A.	Z. Physik 106, 395-404 (1937).	quant.
Goldberg, L.	Astrophys. J. 90, 414-428 (1939).	quant.
Breit, G. & Teller, E.	Astrophys. J. 91, 215-238 (1940).	quant. forb.
Goldberg, L.	Astrophys. J. 93, 244-249 (1941).	quant. forb.
Romberg, W.	Phys. Rev. 71, 706-711 (1947).	SCF
Huang, Su-Shu	Astrophys. J. 108, 354-372 (1948).	comm.
Bates, D. R. & Damgaard, A.	Phil. Trans. Roy. Soc. London. Ser. A. 242, 101-122 (1949).	CA
Veselov, M. G.	Zhur. Eksptl. i Teoret. Fiz. 19, 959-964 (1949) (ATS transl.).	quant.
Wellmann, P.	Z. Astrophys. 30, 71-87 (1952).	estim.
Veselov, M. G.	Vestnik Leningrad Univ. Ser. Fiz. i Khim. No. 8, 181-185 (1953) (transl.).	quant.
Heron, S., McWhirter, R. W. P. & Rhoderick, E. H.	Nature 174, 564-565 (1954) (see also below).	life
Heron, S., McWhirter, R. W. P. & Rhoderick, E. H.	Proc. Roy. Soc. London A 234, 565-582 (1956).	life
Miller, W. F.	Thesis Purdue (1956).	comm.
Vizbaraite, Ya. I., Kantserevichyus, A. I. & Yutsis, A. P.	Optika i Spektroskopiya 1, 9-16 (1956) (transl.).	SCF
Yutsis, A. P., Ushpalis, K. K., Karetskis, V. I. & Levinson, I. B.	Optika i Spektroskopiya 1, 601-605 (1956) (transl.).	quant.

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Miller, W. F. & Platzman, R. L.	Proc. Phys. Soc. London A 70, 299-303 (1957).	comm.
Trefftz, E., Schlüter, A., Dettmar, K. H. & Jörgens, K.	Z. Astrophys. 44, 1-17 (1957).	SCF
Dalgarno, A. & Kingston, A. E.	Proc. Phys. Soc. London A 72, 1053-1060 (1958).	estim.
Mastrup, F. & Wiese, W.	Z. Astrophys. 44, 259-279 (1958).	emiss., rel.
Osherovich, A. L. & Savich, I. G.	Optika i Spektroskopiya 4, 715-718 (1958) (transl.).	incompl.
*Varsavsky, C. M.	Thesis Harvard (1958).	quant.
Aller, L. H. & Jugaku, J.	Astrophys. J. Suppl. Ser. 4, #38, 109-156 (1959).	comm.
Bennett, R. G. & Dalby, F. W.	J. Chem. Phys. 31, 434-441 (1959).	life
Dalgarno, A. & Stewart, A. L.	Proc. Phys. Soc. London A 76, 49-55 (1960).	estim.
Decomps, B., Pebay-Peyroula, J. C. & Brossel, J.	Compt. rend. 251, 941-943 (1960) (transl.).	misc.
McLean, E. A.	"Fourth Symposium on Temperature: Its Measurement and Control in Science and Industry" (ed. Herzfeld, C. M., Reinhold Publ., New York, to be published).	emiss.
Salpeter, E. E. & Zaidi, M. H.	Phys. Rev. 125, 248-255 (1962).	quant.

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Maxwell, L. R.	Phys. Rev. 38, 1664-1686 (1931).	life

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Füchtbauer, C. & Joos, G.	Physik. Z. 23, 73-80 (1922).	absorpt.
Füchtbauer, C., Joos, G. & Dinkelacker, O.	Ann. Physik 71, 204-227 (1923).	absorpt.
Tolman, R. C.	Phys. Rev. 23, 693-709 (1924).	comm.
Wien, W.	Ann. Physik 73, 483-504 (1924).	canal
Skinner, H. W. B.	Proc. Roy. Soc. London A 112, 642-660 (1926).	misc.
Trumpy, B.	Z. Physik 40, 594-617 (1926).	comm.
Hughes, A. L. & Thomas, A. R.	Phys. Rev. 30, 466-472 (1927).	absorpt.
Trumpy, B.	Kgl. Norske Videnskab. Selskabs, Skrifter 1, 1-80 (1927).	absorpt.
Kunze, P.	Ann. Physik 85, 1013-1057 (1928).	absorpt.
Gaviola, E.	Contribucion al Estudio de las Ciencias. Fisicas y Matematics, La Plata, Argentina 5, 65-75 (1929). Universidad Nacional de la Plata Publicaciones de la Facultad de Ciencias Fisicomatematics (transl.).	comm. forb.
Kopfermann, H. & Tietze, W.	Z. Physik 56, 604-616 (1929).	absorpt.
Ladenburg, R.	Nachr. Akad. Wiss. Göttingen, Math.-physik. Kl. 1-5 (1929).	hook
Webb, H. W. & Messenger, H. A.	Phys. Rev. 33, 319-328 (1929).	life
Ladenburg, R. & Wolfsohn, G.	Z. Physik 63, 616-633 (1930).	hook
Ladenburg, R. & Wolfsohn, G.	Z. Physik 65, 207-208 (1930).	comm.
Randall, R. H.	Phys. Rev. 35, 1161-1169 (1930).	life
Richter, E. F.	Ann. Physik 7, 293-328 (1930).	misc.
Thomas, A. R.	Phys. Rev. 35, 1253-1261 (1930).	absorpt.
Garrett, P. H. & Webb, H. W.	Phys. Rev. 37, 1686 (1931).	life
Garrett, P. H.	Phys. Rev. 40, 779-790 (1932).	life
Mitchell, A. C. G.	Phys. Rev. 43, 887-893 (1933).	comm.

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Wolfsohn, G.	Z. Physik 83, 234-247 (1933).	hook
Wolfsohn, G.	Z. Physik 85, 366-372 (1933).	hook
Mitchell, A. C. G. & Murphy, E. J.	Phys. Rev. 45, 759 (1934) (see also below).	misc.
Mitchell, A. C. G. & Murphy, E. J.	Phys. Rev. 46, 53-58 (1934).	misc.
Opechowski, W.	Z. Physik 109, 485-490 (1938).	comm. forb.
King, G. W. & van Vleck, J. H.	Phys. Rev. 56, 464-465 (1939).	quant. forb., rel.
Schouten, J. W.	Thesis Utrecht (1941). [See Schouten, J. W. & Smit, J. A., Physica 10, 661-671 (1943) for results.]	emiss.
Schouten, J. W.	Physica 10, 672-678 (1943).	emiss., rel.
Schouten, J. W. & Smit, J. A.	Physica 10, 661-671 (1943).	emiss.
Lennuier, R. & Cojan, J. L.	Compt. rend. 231, 1450-1452 (1950).	misc.
Mishra, B.	Phys. Rev. 77, 153 (1950).	SCF
Brossel, J.	Phys. Rev. 83, 210 (1951) (see also below).	misc.
Brossel, J.	Thesis Paris (1952) (see also below).	misc.
Brossel, J.	Ann. phys. 7, 622-627 (1952) (see also below).	misc.
Brossel, J. & Bitter, F.	Phys. Rev. 86, 308-316 (1952). [See also Brossel, J., Phys. Rev. 83, 210 (1951).]	misc.
Mishra, B.	Proc. Cambridge Phil. Soc. 48, 511-515 (1952).	SCF
Vainshtein, L. A. & Yavorskii, B. M.	Doklady Akad. Nauk S.S.S.R. 87, 919-922 (1952) (transl.).	incompl.
Vainshtein, L. A. & Yavorskii, B. M.	Zhur. Eksptl. i Teoret. Fiz. 27, 712-718 (1954) (SLA transl. RT-3363).	SCF
Brannen, E., Hunt, F. R., Adlington, R. H. & Nicholls, R. W.	Nature 175, 810-811 (1955).	life
Lebedeva, V. V. & Fabrikant, V. A.	Bull. Acad. Sci. U.S.S.R. Phys. Ser. 19, 2-4 (1955).	emiss., rel. & quant., rel.
Guiochon, M. A., Blamont, J. E. & Brossel, J.	Compt. rend. 243, 1859-1862 (1956).	misc.
Barrat, J. P.	Compt. rend. 244, 2785-2788 (1957) (transl.).	misc.
Boutron, F., Barrat, J. P. & Brossel, J.	Compt. rend. 245, 2250-2253 (1957).	misc.
Guiochon, M. A., Blamont, J. E. & Brossel, J.	J. phys. radium 18, 99-108 (1957).	misc.
Vainshtein, L. A.	Optika i Spektroskopiya 3, 313-321 (1957)(transl.).	incompl.
Descoubes, J. P. & Pebay-Peyroula, J. C.	Compt. rend. 247, 2330-2332 (1958) (transl.).	misc.
Strijland, J. C. & Nanassy, A. J.	Physica 24, 935-936 (1958).	comm.
Addink, N. W. H.	Spectrochim. Acta 15, 349-359 (1959).	emiss.
Barrat, J. P.	J. phys. radium 20, 657-668 (1959).	misc.
Cojan, J. L. & Thibeau, M.	Compt. rend. 249, 1489-1491 (1959) (transl.).	misc.
Pebay-Peyroula, J. C.	J. phys. radium 20, 721-729 (1959).	misc.
Koedam, M. & Krulthof, A. A.	Physica 28, 80-100 (1962).	emiss.

Hg III

AUTHOR	JOURNAL	CLASSIFICATION
Maxwell, L. R.	Phys. Rev. 34, 199-206 (1929).	life

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AUTHOR	JOURNAL	CLASSIFICATION
Maxwell, L. R.	Phys. Rev. 34, 199-206 (1929).	life

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AUTHOR	JOURNAL	CLASSIFICATION
Tolman, R. C.	Phys. Rev. 23, 693-709 (1924).	comm.

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AUTHOR	JOURNAL	CLASSIFICATION
Martin, W. C. & Corliss, C. H.	J. Research Nat. Bur. Standards 64A, 443-479 (1960).	quant. forb.

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Ostrovskii, Yu. I. & Penkin, N. P.	Optika i Spektroskopiya 4, 719-724 (1958) (transl.) (see below for results).	hook
Ostrovskii, Yu. I., Penkin, N. P. & Shabanova, L. N.	Bull. Acad. Sci. U.S.S.R. Phys. Ser. 22, 720-724 (1958).	hook
Ostrovskii, Yu. I., Penkin, N. P. & Shabanova, L. N.	Soviet Phys. - Doklady 3, 538-540 (1958).	hook
Vainshtein, L. A.	Bull. Acad. Sci. U.S.S.R. Phys. Ser. 22, 668-669 (1958).	SCF
Ch'en, S. Y. & Smith, A.	Physica 25, 1289-1293 (1959).	absorpt.
Hanus, W.	Bull. acad. polon. sci. Classe 3, 8, 629-636 (1961).	quant.

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AUTHOR	JOURNAL	CLASSIFICATION
Rupp, E.	Ann. Physik 80, 524-532 (1926).	canal
Ditchburn, R. W.	Proc. Roy. Soc. London A 117, 486-508 (1927).	absorpt.
Prokof'ev, V. K. & Gamow, G.	Z. Physik 44, 887-892 (1927).	hook, rel.
Bleeker, C. E.	Thesis Utrecht (1928).	emiss., rel. & hook, rel.
Lawrence, E. O. & Edlefsen, N. E.	Phys. Rev. 34, 1056-1060 (1929).	absorpt.
Prokof'ev, V. K.	Z. Physik 57, 387-393 (1929). [Same as Zhur. Eksptl. i Teoret. Fiz. 1, 123-127 (1931).]	hook forb., rel.
Weiler, J.	Ann. Physik 1, 361-399 (1929).	misc., rel.
Stevenson, A. F.	Proc. Roy. Soc. London A 128, 591-599 (1930).	quant. forb.
Prokof'ev, V. K.	Zhur. Eksptl. i Teoret. Fiz. 1, 123-127 (1931) (transl.). [Same as Z. Physik 57, 387-393 (1929).]	hook forb., rel.
Filippov, A. N.	Zhur. Eksptl. i Teoret. Fiz. 2, 24-41 (1932) (transl.).	incompl.
Filippov, A. N.	Physik. Z. Sowjetunion 5, 1-5 (1933) (same as below).	hook, rel.
Filippov, A. N.	Zhur. Eksptl. i Teoret. Fiz. 3, 520-523 (1933) (transl.) (same as above).	hook, rel.
Ornstein, L. S. & Key, J.	Physica 1, 945-952 (1934).	emiss., rel.
Prokof'ev, V. K.	Zhur. Eksptl. i Teoret. Fiz. 4, 347-358 (1934) (transl.).	hook, rel.
van der Held, E. F. M. & Heierman, J. H.	Physica 2, 71-74 (1935). [See also ibid. 3, 31-41 (1936).]	emiss., rel.
Coenen, P. A. & Kramers, H. A.	Physica 3, 341-345 (1936).	quant.
Sinclair, D. & Webb, H. W.	Phys. Rev. 50, 440-445 (1936).	life
van der Held, E. F. M. & Heierman, J. H.	Physica 3, 31-41 (1936).	emiss.
Heierman, J. H.	Thesis Utrecht (1937).	emiss.
Key, J.	Thesis Utrecht (1937).	emiss., rel.
Schwarz, K. H.	Physica 7, 361-368 (1940).	emiss.
Rozhestvenskii, D. S. & Penkin, N. P.	Izvest. Akad. Nauk S.S.S.R. Ser. Fiz. 5, 97-101 (1941) (transl.).	hook, rel.

AUTHOR	JOURNAL	CLASSIFICATION
Rozhestvenskii, D. S. & Penkin, N. P.	J. Phys. (U.S.S.R.) 5, 319-337 (1941).	hook, rel. & comm.
Biermann, L.	Physik. Z. 44, 232-233 (1943) (see also below).	SCF
Biermann, L.	Z. Astrophys. 22, 157-164 (1943) (see also below).	SCF
Biermann, L.	Nachr. Akad. Wiss. Göttingen, Math.-physik. Kl. 116-118 (1946-1948) (see also below).	SCF
Biermann, L. & Lübeck, K.	Z. Astrophys. 25, 325-339 (1948).	SCF
Sobolev, N. N.	Zhur. Eksptl. i Teoret. Fiz. 19, 25-35 (1949) (transl.).	incompl.
Mishra, B.	Phys. Rev. 77, 153 (1950).	SCF
Stephenson, G.	Nature 167, 112 (1951) (see also below).	misc.
Stephenson, G.	Proc. Phys. Soc. London A 64, 458-464 (1951).	misc.
Villars, D. S.	J. Opt. Soc. Am. 42, 552-558 (1952).	SCF
Vainshtein, L. A. & Yavorskii, B. M.	Zhur. Eksptl. i Teoret. Fiz. 27, 712-718 (1954) (SLA transl. RT-3363).	SCF
Yanoukh, F.	Vestnik Leningrad Univ. Ser. Fiz. i Khim. 10, 135-142 (1955) (transl.).	incompl.
Bersuker, I. B.	Soviet Phys. - Doklady 2, 167-169 (1957).	SCF & estim.
Hinnov, E. & Kohn, H.	J. Opt. Soc. Am. 47, 156-162 (1957).	emiss.
Ritter, G. J. & Series, G. W.	Proc. Roy. Soc. London A 238, 473-488 (1956-1957).	misc.
Varsavsky, C. M.	Thesis Harvard (1958).	quant.
Addink, N. W. H.	Spectrochim. Acta 15, 349-359 (1959).	emiss.
Heavens, O. S.	J. Opt. Soc. Am. 51, 1058-1061 (1961).	CA
Houziaux, L. & Sadoine, M. P.	Bull. soc. roy. sci. Liège 30, 287-299 (1961).	CA
Naqvi, A. M.	Geophysics Corporation of America Technical Report 61-21-A; ASTIA Document 263 459 (1961).	CA

K IV

Osterbrock, D. E.	Astrophys. J. 114, 469-472 (1951).	quant. forb.

K VI

Osterbrock, D. E.	Astrophys. J. 114, 469-472 (1951).	quant. forb.

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Petersen, R.	Phys. and Chem. Solids 1, 284 (1957).	quant., rel.
Garton, W. R. S., Pery, A. & Codling, K.	"Proceedings Fourth International Conference on Ionization Phenomena in Gases" 206-209 (ed. Nilsson, N. R., North-Holland Publishing Co., Amsterdam, 1960).	absorpt.
Pery-Thorne, A. & Garton, W. R. S.	Proc. Phys. Soc. London A 76, 833-843 (1960).	absorpt.

Kr III

Osterbrock, D. E.	Astrophys. J. 114, 469-472 (1951).	quant. forb.

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La II

AUTHOR	JOURNAL	CLASSIFICATION
Boyarchuk, M. E. & Boyarchuk, A. A.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 234-256 (1960) (transl.).	comm.

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Li I

AUTHOR	JOURNAL	CLASSIFICATION
*Kerschbaum, H.	Sitzber. math.-physik. Kl. bayer. Akad. Wiss. München 19-25 (1926) (see also below).	canal
*Kerschbaum, H.	Ann. Physik 79, 465-488 (1926).	canal
Trumpy, B.	Z. Physik 44, 575-584 (1927). [See also ibid. 57, 787-796 (1929).]	absorpt., rel.
Trumpy, B.	Z. Physik 50, 228-233 (1928).	quant.
*Hargreaves, J.	Proc. Cambridge Phil. Soc. 25, 75-96 (1929).	SCF, rel.
Trumpy, B.	Z. Physik 57, 787-796 (1929).	absorpt., rel. & comm.
Stevenson, A. F.	Proc. Roy. Soc. London A 128, 591-599 (1930).	quant. forb.
Trumpy, B.	Z. Physik 61, 54-60 (1930) (see also below).	SCF
Trumpy, B.	Z. Physik 66, 720 (1930).	comm.
Filippov, A. N.	Z. Physik 69, 526-547 (1931) (same as below).	hook, rel.
Filippov, A. N.	Zhur. Eksptl. i Teoret. Fiz. 2, 24-41 (1932) (transl.) (same as above).	hook, rel.
Filippov, A. N.	Trudy Gosudarst. Opt. Inst. Leningrad 8, 1-118 (1932) (transl.) (results same as above).	hook, rel. & comm.
Fock, V. & Petrashen, M.	Physik. Z. Sowjetunion 8, 547-561 (1935).	SCF
Key, J.	Thesis Utrecht (1937).	emiss., rel.
Bates, D. R. & Damgaard, A.	Phil. Trans. Roy. Soc. London. Ser. A. 242, 101-122 (1949).	SCF
Sobolev, N. N.	Zhur. Eksptl. i Teoret. Fiz. 19, 25-35 (1949) (transl.).	incompl.
Veselov, M. G.	Zhur. Eksptl. i Teoret. Fiz. 19, 959-964 (1949) (ATS transl.).	quant.
Stephenson, G.	Nature 167, 156 (1951).	absorpt.
Vainshtein, L. A. & Yavorskii, B. M.	Doklady Akad. Nauk S.S.S.R. 87, 919-922 (1952).	incompl.
Vainshtein, L. A. & Yavorskii, B. M.	Zhur. Eksptl. i Teoret. Fiz. 27, 712-718 (1954) (SLA transl. RT-3363).	SCF & quant.
Hinnov, E. & Kohn, H.	J. Opt. Soc. Am. 47, 156-162 (1957).	emiss.
Dronov, A. P., Sviridov, A. G. & Sobolev, N. N.	Optika i Spektroskopiya 5, 490-499 (1958) (transl. Johns Hopkins APL Library Bulletin TG230-T159).	emiss., rel.
*Varsavsky, C. M.	Thesis Harvard (1958).	quant.
Heavens, O.S.	J. Opt. Soc. Am. 51, 1058-1061 (1961).	CA
Naqvi, A. M.	Geophysics Corporation of America Technical Report 61-21-A; ASTIA Document 263 459 (1961).	CA

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AUTHOR	JOURNAL	CLASSIFICATION
Veselov, M. G.	Zhur. Eksptl. i Teoret. Fiz. 19, 959-964 (1949) (ATS transl.).	quant.
Veselov, M. G.	Vestnik Leningrad Univ. Ser. Fiz. i Khim. No. 8, 181-185 (1953) (transl.).	quant.
Yutsis, A. P., Ushpalis, K. K., Kavetskis, V. I. & Levinson, I. B.	Optika i Spektroskopiya 1, 601-605 (1956) (transl.).	quant.

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AUTHOR	JOURNAL	CLASSIFICATION
Russell, H. N.	Astrophys. J. 78, 239-297 (1927).	estim.
Prokof'ev, V. K.	Z. Physik 50, 701-715 (1928) (same as below).	estim.
Prokof'ev, V. K.	Zhur. Eksptl. i Teoret. Fiz. 1, 111-122 (1931) (transl.) (same as above).	estim.
Rubenstein, P. J.	Phys. Rev. Letters 58, 1007 (1940).	quant., rel.
Kersten, J. A. H.	Thesis Utrecht (1941) (see below for results).	emiss., rel.
Kersten, J. A. H. & Ornstein, L. S.	Physica 8, 1124-1136 (1941).	emiss., rel.
Schuttevaer, J. W., de Bont, M. J. & van den Broek, Th. H.	Physica 10, 544-552 (1943).	emiss., rel.
Wilson, O. C.	Astrophys. J. 107, 126-150 (1948).	misc., rel.
Biermann, L. & Trefftz, E.	Z. Astrophys. 26, 213-239 (1949) (see also below).	SCF
Trefftz, E.	Z. Astrophys. 26, 240-263 (1949) (see also below).	SCF
Trefftz, E.	Z. Astrophys. 28, 67-78 (1950).	SCF
Aller, L. H., Hazen, M., Doherty, L., Grant, G., Jugaku, J., Spiegel, E. & Waddell, J.	Publications of the Observatory, Univ. of Michigan (Feb. 19, 1954).	misc., rel.
Allen, C. W.	Monthly Notices Roy. Astron. Soc. 117, 622-628 (1957).	emiss. & CA
Vainshtein, L. A.	Optika i Spektroskopiya 3, 313-321 (1957) (transl.).	incompl.
Boldt, G.	Z. Physik 150, 205-214 (1958).	absorpt.
Ostrovskii, Yu. I., Penkin, N. P. & Shabanova, L. N.	Bull. Acad. Sci. U.S.S.R. Phys. Ser. 22, 720-724 (1958) (results same as below).	hook
Ostrovksii, Yu. I., Penkin, N. P. & Shabanova, L. N.	Soviet Phys. - Doklady 3, 538-540 (1958) (results same as above).	hook
Varsavsky, C. M.	Thesis Harvard (1958).	quant.
Addink, N. W. H.	Spectrochim. Acta 15, 349-359 (1959).	emiss.
Boyarchuk, M. E. & Boyarchuk, A. A.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 234-256 (1960) (transl.).	comm.
Goldberg, L., Müller, E. A. & Aller, L. H.	Astrophys. J. Suppl. Ser. 5, #45, 1-137 (1960).	CA
Brehm, B., Demtröder, W. & Osberghaus, O.	Z. Naturforsch. 16a, 843 (1961) (see also below).	life
Demtröder, W.	Thesis Bonn (1961) (see also below for results).	life
Demtröder, W.	Z. Physik 166, 42-45 (1962).	life

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AUTHOR	JOURNAL	CLASSIFICATION
Russell, H. N.	Astrophys. J. 78, 239-297 (1927).	estim.
Biermann, L.	Physik. Z. 44, 232-233 (1943) (see also below).	SCF
Biermann, L.	Z. Astrophys. 22, 157-164 (1943) (see also below).	SCF
Biermann, L.	Nachr. Akad. Wiss. Göttingen, Math.-physik. Kl. 116-118 (1946-1948) (see also below).	SCF
Biermann, L. & Lübeck, K.	Z. Astrophys. 25, 325-339 (1948).	SCF
Aller, L. H., Hazen, M., Doherty, L., Grant, G., Jugaku, J., Spiegel, E. & Waddell, J.	Publications of the Observatory, Univ. of Michigan (Feb. 19, 1954).	misc., rel.
Nagibina, I. M.	Bull. Acad. Sci. U.S.S.R. Phys. Ser. 22, 678-679 (1958).	emiss., rel.
Varsavsky, C. M.	Thesis Harvard (1958).	quant.
Boyarchuk, M. E. & Boyarchuk, A. A.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 234-256 (1960) (transl.).	comm.

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AUTHOR	JOURNAL	CLASSIFICATION
Frerichs, R.	Ann. Physik 81, 807-845 (1926).	emiss., rel.
Seward, R. S.	Phys. Rev. 37, 344-361 (1931).	emiss., rel.
Huldt, L. & Lagerqvist, A.	Arkiv Fysik 5, 91-95 (1951) (see also below).	emiss.
Huldt, L. & Lagerqvist, A.	J. Opt. Soc. Am. 42, 142 (1952) (results same as above).	emiss.
Bell, G. D.	Thesis California Institute of Technology (1956-1957). [See Bell, G. D., et al., Astrophys. J. 129, 437-440 (1959) for results.]	absorpt.
Nikonova, E. I. & Prokof'ev, V. K.	Optika i Spektroskopiya 1, 290-297 (1956) (transl.).	hook, rel.
Ostrovskii, Yu. I., Parchevskii, G. F. & Penkin, N. P.	Optika i Spektroskopiya 1, 821-832 (1956) (transl.).	incompl.
Allen, C. W. & Asaad, A. S.	Monthly Notices Roy. Astron. Soc. 117, 36-49 (1957).	emiss.
Bell, G. D.	Astron. J. 62, 7 (1957). [See Bell, G. D., et al., Astrophys. J. 129, 437-440 (1959) for results.]	comm.
Hinnov, E. & Kohn, H.	J. Opt. Soc. Am. 47, 156-162 (1957).	emiss.
Ostrovskii, Yu. I. & Penkin, N. P.	Optika i Spektroskopiya 3, 193-201 (1957) (transl.).	hook
Dvornikova, I. U. & Nagibina, I. M.	Optika i Spektroskopiya 4, 421-429 (1958).	incompl.
Nagibina, I. M.	Optika i Spektroskopiya 4, 430-437 (1958) (transl.).	incompl.
Addink, N. W. H.	Spectrochim. Acta 15, 349-359 (1959).	emiss.
Bell, G. D., Davis, M. H., King, R. B. & Routly, P. M.	Astrophys. J. 129, 437-440 (1959).	absorpt.
Allen, C. W.	Monthly Notices Roy. Astron. Soc. 121, 299-332 (1960).	comm. & CA
Boyarchuk, M. E. & Boyarchuk, A. A.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 234-256 (1960) (transl.).	comm.
Korolev, F. A. & Kvaratskheli, Iu. K.	Optics and Spectroscopy (U.S.S.R.) 10, 200-202 (1961).	emiss., rel.

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AUTHOR	JOURNAL	CLASSIFICATION
Seward, R. S.	Phys. Rev. 37, 344-361 (1931).	emiss., rel.
Wilson, O. C.	Astrophys. J. 107, 126-150 (1948).	misc., rel.
Nagibina, I. M.	Bull. Acad. Sci. U.S.S.R. Phys. Ser. 22, 678-679 (1958).	emiss., rel.
Boyarchuk, M. E. & Boyarchuk, A. A.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 234-256 (1960) (transl.).	comm.

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AUTHOR	JOURNAL	CLASSIFICATION
Nikonova, E. I. & Prokof'ev, V. K.	Optika i Spektroskopiya 1, 290-297 (1956) (transl.).	hook, rel.

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AUTHOR	JOURNAL	CLASSIFICATION
Petrie, W.	J. Geophys. Research 55, 143-151 (1950).	quant.
*Ufford, C. W. & Gilmour, R. M.	Astrophys. J. 111, 580-581 (1950).	quant. forb., rel.
Garstang, R. H.	Astrophys. J. 115, 506-508 (1952).	quant. forb.
Motschmann, H.	Z. Physik 143, 77-92 (1955).	emiss.
Garstang, R. H.	"The Airglow & the Aurorae," 324-327 (ed. Armstrong & Dalgarno, Pergamon Press, New York, 1956).	quant. forb.
*Varsavsky, C. M.	Thesis Harvard (1958).	quant.

AUTHOR	JOURNAL	CLASSIFICATION
Bates, D. R.	"Physics of the Upper Atmosphere," 300-302 (ed. Ratcliffe, J. A., Academic Press, New York, 1960).	comm. forb.
Goldberg, L., Müller, E. A. & Aller, L. H.	Astrophys. J. Suppl. Ser. 5, #45, 1-137 (1960).	CA
Doherty, L. R.	Thesis Michigan (1961).	emiss.
Naqvi, A. M.	Geophysics Corporation of America Technical Report 61-21-A; ASTIA Document 263 459 (1961).	CA & comm. forb.
Richter, J.	Z. Astrophys. 51, 177-186 (1961).	emiss.

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AUTHOR	JOURNAL	CLASSIFICATION
*Stevenson, A. F.	Proc. Roy. Soc. London A 137, 298-325 (1932).	quant. forb.
*Condon, E. U.	Astrophys. J. 79, 217-234 (1934).	quant. forb.
Garstang, R. H.	Monthly Notices Roy. Astron. Soc. 111, 115-124 (1951).	quant. forb.
Vainshtein, L. A. & Yavorskii, B. M.	Doklady Akad. Nauk S.S.S.R. 87, 919-922 (1952) (transl.).	incompl.
Yamanouchi, T. & Horie, H.	J. Phys. Soc. Japan 7, 52-56 (1952).	quant. forb.
Mandel'shtam, S. L. & Sukhodrev, N. K.	Zhur. Eksptl. i Teoret. Fiz. 24, 701-707 (1953).	incompl.
Yilmaz, H.	Phys. Rev. 100, 1148-1153 (1955).	quant. forb.
Bolotin, A. B., Levinson, I. B. & Levin, L. I.	Soviet Phys. - JETP 2, 391-395 (1956).	quant.
McCarroll, R. J. & Wakely, P. G.	"The Airglow and the Aurorae," 337-339 (ed. Armstrong & Dalgarno, Pergamon Press, New York, 1956).	SCF
Mastrup, F. & Wiese, W.	Z. Astrophys. 44, 259-279 (1958).	emiss.
*Varsavsky, C. M.	Thesis Harvard (1958).	quant.
Aller, L. H. & Jugaku, J.	Astrophys. J. Suppl. Ser. 4, #38, 109-156 (1959).	CA
Bates, D. R.	"Physics of the Upper Atmosphere" 300-302 (ed. Ratcliffe, J. A., Academic Press, New York, 1960).	comm. forb.
Gaustad, J. E. & Spitzer, Jr., L.	Astrophys. J. 134, 771-776 (1961).	estim.
Jugaku, J., Sargent, L. W. & Greenstein, J. L.	Astrophys. J. 134, 783-796 (1961).	CA
Naqvi, A. M.	Geophysics Corporation of America Technical Report 61-21-A; ASTIA Document 263 459 (1961).	comm. forb.

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AUTHOR	JOURNAL	CLASSIFICATION
Aller, L. H.	Astrophys. J. 97, 135-165 (1943).	quant.
Vainshtein, L. A. & Yavorskii, B. M.	Doklady Akad. Nauk S.S.S.R. 87, 919-922 (1952) (transl.).	incompl.
Bolotin, A. B. & Yutsis, A. P.	Zhur. Eksptl. i Teoret. Fiz. 24, 537-543 (1953) (transl.).	SCF
Mandel'shtam, S. L. & Sukhodrev, N. K.	Zhur. Eksptl. i Teoret. Fiz. 24, 701-707 (1953) (transl.).	incompl.
Gaustad, J. E. & Spitzer, Jr., L.	Astrophys. J. 134, 771-776 (1961).	estim.

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AUTHOR	JOURNAL	CLASSIFICATION
Aller, L. H.	Astrophys. J. 97, 135-165 (1943).	quant.
Bolotin, A. B. & Yutsis, A. P.	Zhur. Eksptl. i Teoret. Fiz. 24, 537-543 (1953) (transl.).	SCF

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AUTHOR	JOURNAL	CLASSIFICATION
Ladenburg, R. & Minkowski, R.	Z. Physik 6, 153-164 (1921) (see also below).	misc.
Minkowski, R.	Thesis Breslau (1921) (see below for results).	misc.
Minkowski, R.	Ann. Physik 66, 206-226 (1921).	misc.
Thomas, W.	Z. Physik 24, 169-196 (1924).	estim.
Tolman, R. C.	Phys. Rev. 23, 693-709 (1924).	comm.
Bartels, H.	Z. Physik 32, 415-438 (1925).	quant.
Ellett, A.	J. Opt. Soc. Am. 10, 427-437 (1925).	misc.
Gerlach, W. & Schütz, W.	Physik. Z. 26, 33-35 (1925).	comm.
Harrison, G. R.	Phys. Rev. 25, 768-782 (1925).	absorpt., rel.
Hoyt, F. C.	Phys. Rev. 26, 749-760 (1925).	quant., rel.
Trumpy, B.	Z. Physik 34, 715-721 (1925).	absorpt., rel.
Kerschbaum, H.	Ann. Physik 79, 465-488 (1926).	canal
Kerschbaum, H.	Sitzber. math.-physik. Kl. bayer. Akad. Wiss. München, 19-25 (1926) (see also above).	canal
Sugiura, Y.	Phil. Mag. 4, 495-504 (1927).	quant.
Trumpy, B.	Z. Physik 42, 327-328 (1927).	comm.
Trumpy, B.	Kgl. Norske Videnskab. Selskabs, Skrifter 1, 1-80 (1927).	absorpt.
Bleeker, C. E.	Thesis Utrecht (1928).	emiss., rel.
Ladenburg, R.	Z. Physik 48, 15-25 (1928).	comm.
Ladenburg, R. & Minkowski, R.	Ann. Physik 87, 298-306 (1928).	comm.
Ornstein, L. S. & van der Held, E. F. M.	Ann. Physik 85, 953-960 (1928).	emiss.
Filippov, A. & Prokof'ev, V. K.	Z. Physik 56, 458-476 (1929).	hook, rel.
Hupfeld, H.	Z. Physik 54, 484-497 (1929).	life
Prokof'ev, V. K.	Z. Physik 57, 387-393 (1929). [Same as Zhur. Eksptl. i Teoret. Fiz. 1, 123-127 (1931).]	hook forb., rel.
Prokof'ev, V. K.	Z. Physik 58, 255-267 (1929).	quant.
Weiss, C.	Ann. Physik 1, 565-612 (1929).	emiss., rel.
Ladenburg, R. & Thiele, E.	Z. physik. Chem. B 7, 161-187 (1930).	comm.
Stevenson, A. F.	Proc. Roy. Soc. London A 128, 591-599 (1930).	quant. forb.
Trumpy, B.	Z. Physik 61, 54-60 (1930) .	SCF
Berry, N. E. & Rollefson, G. K.	Phys. Rev. 38, 1599-1611 (1931).	emiss., rel.
Ladenburg, R. & Thiele, E.	Z. Physik 72, 697-699 (1931).	comm.
Prokof'ev, V. K.	Zhur. Eksptl. i Teoret. Fiz. 1, 123-127 (1931) (transl.). [Same as Z. Physik 57, 387-393 (1929).]	hook forb., rel.
Weingeroff, M.	Z. Physik 67, 679-698 (1931).	misc.
Zehden, W.	Naturwissenschaften 19, 826-827 (1931).	absorpt.
Duschinsky, F.	Z. Physik 78, 586-602 (1932).	life
Filippov, A. N.	Zhur. Eksptl. i Teoret. Fiz. 2, 24-41 (1932) (transl.).	hook, rel.
van der Held, E. F. M.	Thesis Utrecht (1932) (transl.) (see below for results).	emiss.
van der Held, E. F. M. & Ornstein, L. S.	Z. Physik 77, 459-477 (1932).	emiss.
Ornstein, L. S. & Key, J.	Z. Physik 85, 565-567 (1933).	emiss., rel.
Zehden, W.	Z. Physik 86, 555-582 (1933).	absorpt.
Fock, V.	Z. Physik 89, 744-749 (1934).	comm.
Ornstein, L. S. & Key, J.	Physica 1, 945-952 (1934).	emiss., rel.
Fock, V. & Petrashen, M.	Physik. Z. Sowjetunion 8, 547-561 (1935).	SCF
Minkowski, R. & Weber-Schäfer, M.	Z. Physik 94, 172-175 (1935).	comm.
Minkowski, R., Müller, H. G. & Weber-Schäfer, M.	Z. Physik 94, 145-171 (1935).	emiss.
Righini, G.	Z. Astrophys. 10, 344-352 (1935).	estim.
Key, J.	Thesis Utrecht (1937).	emiss., rel.
Rozhestvenskii, D. S. & Penkin, N. P.	J. Phys. (U.S.S.R.) 5, 319-337 (1941).	hook, rel. & comm.
Rozhestvenskii, D. S. & Penkin, N. P.	Izvest. Akad. Nauk S.S.S.R. Ser. Fiz. 5, 97-101 (1941) (transl.).	hook, rel.
Biermann, L.	Z. Astrophys. 22, 157-164 (1943) (see also below).	SCF
Biermann, L.	Physik. Z. 44, 232-233 (1943). [See also Nachr. Akad. Wiss. Göttingen Math.-physik. Kl. 116-118 (1946).]	SCF

AUTHOR	JOURNAL	CLASSIFICATION
Paul, W.	Z. Physik 124, 121-128 (1944).	misc.
Kvater, G. S.	Izvest. Akad. Nauk S.S.S.R. Ser. Fiz. 9, 236-237 (1945) (transl.).	incompl.
Biermann, L.	Nachr. Akad. Wiss. Göttingen Math.-physik. Kl. 116-118 (1946). [See also Biermann, L. & Lübeck, K., Z. Astrophys. 25, 325-339 (1948).]	SCF
Dupuy, G.	Compt. rend. 222, 654-656 (1946) (transl.).	comm.
Kvater, G. S.	Vestnik Leningrad Univ. Ser. Fiz. i Khim. No. 2, 135-141 (1947) (transl.).	incompl.
Biermann, L. & Lübeck, K.	Z. Astrophys. 25, 325-339 (1948).	SCF
Bates, D. R. & Damgaard, A.	Phil. Trans. Roy. Soc. London. Ser. A. 242, 101-122 (1949).	CA & SCF
Sobolev, N. N.	Zhur. Eksptl. i Teoret. Fiz. 19, 25-35 (1949) (transl.).	incompl.
Seaton, M. J.	Proc. Roy. Soc. London A 208, 418-430 (1951).	comm.
Stephenson, G.	Nature 167, 112 (1951) (see also below).	misc.
Stephenson, G.	Proc. Phys. Soc. London A 64, 458-464 (1951).	misc.
Vainshtein, L. A. & Yavorskii, B. M.	Doklady Akad. Nauk S.S.S.R. 87, 919-922 (1952) (transl.).	incompl.
Petrashen, M. I. & Abarenkov, I. V.	Vestnik Leningrad Univ. Ser. Fiz. i Khim. No. 9, 141-148 (1954).	incompl.
Vainshtein, L. A. & Yavorskii, B. M.	Zhur. Eksptl. i Teoret. Fiz. 27, 712-718 (1954) (SLA transl. RT-3363).	SCF & quant.
Yanoukh, F.	Vestnik Leningrad Univ. Ser. Fiz. i Khim. No. 10, 135-142 (1955) (transl.).	incompl.
Anderson, E. M., Buska, Z. A., Grinberg, R. O. & Saulgozha, A. K.	Vestnik Leningrad Univ. Ser. Fiz. i Khim. No. 4, 27-31 (1956) (transl.).	incompl.
Bersuker, I. B.	Soviet Phys. - Doklady 2, 167-169 (1957).	SCF & estim.
Hinnov, E. & Kohn, H.	J. Opt. Soc. Am. 47, 156-162 (1957).	emiss.
Vainshtein, L. A.	Optika i Spektroskopiya 3, 313-321 (1957) (transl.).	incompl.
Bersuker, I. B.	Bull. Acad. Sci. U.S.S.R. Phys. Ser. 22, 743-746 (1958).	SCF
Descoubes, J. P. & Pebay-Peyroula, J. C.	Compt. rend. 247, 2330-2332 (1958) (transl.).	misc.
Dronov, A. P., Sviridov, A. G. & Sobolev, N. N.	Optika i Spektroskopiya 5, 490-499 (1958) (transl. Johns Hopkins APL Library Bulletin TG230-T159).	emiss., rel.
Krüger, H. & Scheffler, K.	J. phys. radium 19, 854-857 (1958).	misc.
Varsavsky, C. M.	Thesis Harvard (1958).	quant.
Addink, N. W. H.	Spectrochim. Acta 15, 349-359 (1959).	emiss.
Archambault, Y., Descoubes, J. P., Priou, M., Omont, A. & Pebay-Peyroula, J. C.	J. phys. radium 21, 677-679 (1959) (transl.).	misc.
Goldberg, L., Müller, E. A. & Aller, L. H.	Astrophys. J. Suppl. Ser. 5, #45, 1-137 (1960).	CA
Brehm, B., Demtröder, W. & Osberghaus, O.	Z. Naturforsch. 16a, 843 (1961). [See also Demtröder, W., Thesis Bonn (1961) and Z. Physik 166, 42-45 (1962).]	life
Demtröder, W.	Thesis Bonn (1961). [See Z. Physik 166, 42-45 (1962) for results.]	life
Heavens, O. S.	J. Opt. Soc. Am. 51, 1058-1061 (1961).	CA
Houziaux, L. & Sadoine, M. P.	Bull. soc. roy. sci. Liège 30, 287-299 (1961).	CA
Naqvi, A. M.	Geophysics Corporation of America Technical Report 61-21-A; ASTIA Document 263 459 (1961).	CA
Ostrovskii, Yu. I. & Penkin, N. P.	Optics and Spectroscopy (U.S.S.R.) 11, 1-5 (1961).	hook
Demtröder, W.	Z. Physik 166, 42-45 (1962).	life

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Petersen, R.	Phys. and Chem. Solids 1, 284 (1957).	quant., rel.

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Ne I

AUTHOR	JOURNAL	CLASSIFICATION
Ladenburg, R., Kopfermann, H. & Carst, A.	Sitzber. deut. Akad. Wiss. Berlin, Kl. Math., Phys. u Tech. No. 21, 255-273 (1926).	hook
Kopfermann, H. & Ladenburg, R.	Z. Physik 48, 51-61 (1928) (see also below).	hook
Kopfermann, H. & Ladenburg, R.	Z. Physik 65, 167-188 (1930) (see also below).	hook
Ladenburg, R.	Rev. Mod. Phys. 5, 243-256 (1933).	hook, hook, rel. & comm.
Schütz, W.	Ann. Physik 18, 705-720 (1933).	misc.
Griffiths, J. H. E.	Proc. Roy. Soc. London A 143, 588-604 (1934).	life
Ladenburg, R. & Levy, S.	Z. Physik 88, 461-468 (1934).	emiss.
Shortley, G. H.	Phys. Rev. 47, 295-300 (1935).	quant. & comm.
Garbuny, M.	Z. Physik 107, 362-368 (1937).	emiss., rel.
Ufford, C. W.	Astrophys. J. 85, 249-250 (1937).	quant.
Phelps, A. V.	Phys. Rev. 100, 1230 (1955).	life forb.
Petersen, R.	Phys. and Chem. Solids 1, 284 (1957).	quant., rel.
*Varsavsky, C. M.	Thesis Harvard (1958).	quant.
Gold, A. & Knox, R. S.	Phys. Rev. 113, 834-839 (1959).	SCF
Phelps, A. V.	Phys. Rev. 114, 1011-1025 (1959).	comm., rel.
Osherovich, A. L. & Petelin, G. M.	Soviet Phys. - Doklady 4, 1289-1291 (1960).	life
Doherty, L. R.	Thesis Michigan (1961).	emiss.
Frish, S. Z. & Bochkova, O. P.	Vestnik Leningrad Univ. Ser. Fiz. i Khim. No. 16, 40-58 (1961) (transl.).	incompl.

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AUTHOR	JOURNAL	CLASSIFICATION
Garstang, R. H.	Monthly Notices Roy. Astron. Soc. 110, 612-614 (1950).	CA & SCF
Garstang, R. H.	Monthly Notices Roy. Astron. Soc. 114, 118-133 (1954).	quant., rel. & CA
Traving, G.	Z. Astrophys. 36, 1-41 (1955).	CA
Aller, L. H., Elste, G. & Jugaku, J.	Astrophys. J. Suppl. Ser. 3, #25, 1-35 (1957).	CA

Ne III

AUTHOR	JOURNAL	CLASSIFICATION
Garstang, R. H.	Monthly Notices Roy. Astron. Soc. 111, 115-124 (1951).	quant. forb.

Ne IV

AUTHOR	JOURNAL	CLASSIFICATION
Garstang, R. H.	Monthly Notices Roy. Astron. Soc. 120, 201-203 (1960).	quant. forb.

Ne V

AUTHOR	JOURNAL	CLASSIFICATION
Obi, S.	Publ. Astron. Soc. Japan 2, 150-155 (1950).	quant. forb., rel.
Garstang, R. H.	Monthly Notices Roy. Astron. Soc. 111, 115-124 (1951).	quant. forb.
Bolotin, A. B., Levinson, I. B. & Levin, L. I.	Soviet Phys. - JETP 2, 391-395 (1956).	quant.

Ne VII

AUTHOR	JOURNAL	CLASSIFICATION
Veselov, M. G.	Zhur. Eksptl. i Teoret. Fiz. 19, 959-964 (1949) (ATS transl.).	quant.
Veselov, M. G.	Vestnik Leningrad Univ. Ser. Fiz. i Khim. No. 8, 181-185 (1953) (transl.).	quant.

Ne VIII

AUTHOR	JOURNAL	CLASSIFICATION
Veselov, M. G.	Zhur. Eksptl. i Teoret. Fiz. 19, 959-964 (1949) (ATS transl.).	quant.

Ne IX

AUTHOR	JOURNAL	CLASSIFICATION
Veselov, M. G.	Zhur. Eksptl. i Teoret. Fiz. 19, 959-964 (1949) (ATS transl.).	quant.
Veselov, M. G.	Vestnik Leningrad Univ. Ser. Fiz. i Khim. No. 8, 181-185 (1953) (transl.).	quant.

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Ni I

AUTHOR	JOURNAL	CLASSIFICATION
Bouma, T.	Thesis Utrecht (1930) (see below for results).	emiss., rel.
Ornstein, L. S. & Bouma, T.	Phys. Rev. 36, 679-693 (1930).	emiss., rel.
van Driel, H.	Thesis Utrecht (1935).	emiss., rel.
King, R. B.	Astrophys. J. 108, 87-91 (1948).	absorpt., rel.
Wilson, O. C.	Astrophys. J. 107, 126-150 (1948).	misc., rel.
Estabrook, F. B.	Thesis California Institute of Technology (1950) (see below for results).	absorpt.
Estabrook, F. B.	Astrophys. J. 113, 684-689 (1951).	absorpt.
Parchevskii, G. F. & Penkin, N. P.	Bull. Acad. Sci. U.S.S.R. Phys. Ser. 19, 4-5 (1955).	comm.
Allen, C. W. & Asaad, A. S.	Monthly Notices Roy. Astron. Soc. 117, 36-49 (1957).	emiss.
Hinnov, E. & Kohn, H.	J. Opt. Soc. Am. 47, 156-162 (1957).	emiss.
Varsavsky, C. M.	Thesis Harvard (1958).	quant.
Addink, N. W. H.	Spectrochim. Acta 15, 349-359 (1959).	emiss.
Allen, C. W.	Monthly Notices Roy. Astron. Soc. 121, 299-332 (1960).	comm. & CA
Boyarchuk, M. E. & Boyarchuk, A. A.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 234-256 (1960) (transl.).	comm.
Mitrofanova, L. A.	Pulkovo. Astronomicheskaia observatoriia. Izvestiia 21, 185-189 (1960) (transl.).	emiss., rel.

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AUTHOR	JOURNAL	CLASSIFICATION
Ornstein, L. S. & Bouma, T.	Phys. Rev. 36, 679-693 (1930).	emiss., rel.
Aller, L. H., Hazen, M., Doherty, L., Grant, G., Jugaku, J., Spiegel, E. & Waddell, J.	Publications of the Observatory, Univ. of Michigan (Feb. 19, 1954).	misc., rel.
Garstang, R. H.	Monthly Notices Roy. Astron. Soc. 118, 234-240 (1958).	quant. forb.
Boyarchuk, M. E. & Boyarchuk, A. A.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 234-256 (1960) (transl.).	comm.
Groth, H. G.	Z. Astrophys. 51, 231-285 (1961).	misc.

Ni III

AUTHOR	JOURNAL	CLASSIFICATION
Garstang, R. H.	Monthly Notices Roy. Astron. Soc. 118, 234-240 (1958).	quant. forb.

Ni XII

AUTHOR	JOURNAL	CLASSIFICATION
Edlén, B.	Z. Astrophys. 22, 30-64 (1942).	quant. forb.
Huang, K.	Astrophys. J. 101, 187-195 (1945).	misc. forb.

Ni XIII

AUTHOR	JOURNAL	CLASSIFICATION
Edlén, B.	Z. Astrophys. 22, 30-64 (1942).	quant. forb.
Huang, K.	Astrophys. J. 101, 187-195 (1945).	misc. forb.

Ni XV

AUTHOR	JOURNAL	CLASSIFICATION
Edlén, B.	Z. Astrophys. 22, 30-64 (1942).	quant. forb.
Huang, K.	Astrophys. J. 101, 187-195 (1945).	misc. forb.

Ni XVI

AUTHOR	JOURNAL	CLASSIFICATION
Edlén, B.	Z. Astrophys. 22, 30-64 (1942).	quant. forb.
Huang, K.	Astrophys. J. 101, 187-195 (1945).	misc. forb.

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O I

AUTHOR	JOURNAL	CLASSIFICATION
*Russell, H. N.	Astrophys. J. 78, 239-297 (1927).	estim.
*Condon, E. U.	Astrophys. J. 79, 217-234 (1934).	quant. forb.
*Bowen, I. S.	Rev. Mod. Phys. 20, 109-112 (1948).	estim.
Petrle, W., Monaghan, P. A. & Dolan, P. A.	Can. J. Research 27A, 213-217 (1949).	quant.
Emeleus, K. G., Sayers, N. D. & Bailey, R. A.	Nature 166, 656-657 (1950).	life forb.
Petrie, W.	J. Geophys. Research 55, 143-151 (1950).	quant.
Garstang, R. H.	Monthly Notices Roy. Astron. Soc. 111, 115-124 (1951).	quant. forb.
Sayers, N. D. & Emeleus, K. G.	Proc. Phys. Soc. London A 65, 219-226 (1952). [See also Emeleus, K. G., *et al*., Nature 166, 656-657 (1950).]	life forb. & comm.
Yamanouchi, T. & Horie, H.	J. Phys. Soc. Japan 7, 52-56 (1952).	quant. forb.
Herman, L. & Herman, R.	"Proceedings of the Conference on Auroral Physics" No. 30, 221-241 (1954).	life. forb.
Jürgens, G.	Z. Physik 138, 613-622 (1954).	emiss.
Kingsbury, R. F.	Phys. Rev. 99, 1846-1850 (1955).	SCF
Omholt, A. & Harang, L.	J. Atmospheric and Terrest. Phys. 7, 247-253 (1955). [See also Omholt, A., Geofys. Publikasjoner Norske Videnskaps-Akad. i Oslo 21, 1-38 (1959).]	life forb.
Garstang, R. H.	"The Airglow and the Aurorae" 324-327 (ed. Armstrong and Dalgarno, Pergamon Press, New York, 1956).	quant. forb.
Omholt, A.	J. Atmospheric and Terrest. Phys. 9, 28-35 (1956).	CA & SCF
Omholt, A.	"The Airglow and the Aurorae" 178-182 (ed. Armstrong and Dalgarno, Pergamon Press, New York, 1956). [See also Geofys. Publikasjoner Norske Videnskaps-Akad. i Oslo 21, 1-38 (1959).]	life forb. & comm.
Vainshtein, L. A.	Optika i Spektroskopiya 3, 313-321 (1957) (transl.).	incompl.
Liszka, L. & Niewodniczanski, H.	Acta Phys. Polon. 17, 345-351 (1958).	emiss. forb., rel.
*Varsavsky, C. M.	Thesis Harvard (1958).	quant.
Omholt, A.	Geofys. Publikasjoner Norske Videnskaps-Akad. i Oslo 21, 1-38 (1959).	misc. & life forb.
Bates, D. R.	"Physics of the Upper Atmosphere" 300-302 (ed. Ratcliffe, J. A., Academic Press, New York, 1960).	comm. forb.

AUTHOR	JOURNAL	CLASSIFICATION
Goldberg, L., Müller, E. A. & Aller, L. H.	Astrophys. J. Suppl. Ser. 5, #45, 1-137 (1960).	CA
Omholt, A.	Planetary and Space Science 2, 246-248 (1960).	life forb.
Stoffregen, W. & Derblom, H.	Nature 185, 28-29 (1960) (see also above).	life forb.
Doherty, L. R.	Thesis Michigan (1961).	emiss.
Garstang, R. H.	Proc. Cambridge Phil. Soc. 57, 115-120 (1961).	quant. & quant. forb.
Naqvi, A. M.	Geophysics Corporation of America Technical Report 61-21-A; ASTIA Document 263 459 (1961).	CA
Wiese, W. L. & Shumaker, Jr., J. B.	J. Opt. Soc. Am. 51, 937-942 (1961).	emiss.
Foster, E. W.	Proc. Phys. Soc. London A 79, 94-104 (1962).	emiss.

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*Russell, H. N.	Astrophys. J. 78, 239-297 (1927).	estim.
Rubinowicz, A.	Z. Physik 65, 662-676 (1930).	quant., rel.
*Condon, E. U.	Astrophys. J. 79, 217-234 (1934).	quant. forb.
Aller, L. H. & Menzel, D. H.	Astrophys. J. 102, 239-263 (1945).	quant.
Bates, D. R. & Damgaard, A.	Astrophys. J. 107, 383-385 (1948).	SCF
Aller, L. H., Ufford, C. W. & van Vleck, J. H.	Astrophys. J. 109, 42-52 (1949).	quant. forb.
Garstang, R. H.	Astrophys. J. 115, 506-508 (1952).	quant. forb.
Yamanouchi, T. & Horie, H.	J. Phys. Soc. Japan 7, 52-56 (1952).	quant. forb.
Garstang, R. H.	Monthly Notices Roy. Astron. Soc. 114, 118-133 (1954).	quant., rel. & CA
Traving, G.	Z. Astrophys. 36, 1-41 (1955).	CA
Garstang, R. H.	"The Airglow and the Aurorae" 324-327 (ed. Armstrong & Dalgarno, Pergamon Press, New York, 1956).	quant. forb.
Aller, L. H., Elste, G. & Jugaku, J.	Astrophys. J. Suppl. Ser. 3, #25, 1-35 (1957).	CA
Naqvi, A. M. & Talwar, S. P.	Monthly Notices Roy. Astron. Soc. 117, 463-471 (1957).	quant. forb.
Seaton, M. J. & Osterbrock, D. E.	Astrophys. J. 125, 66-83 (1957).	quant. forb.
Mastrup, F. & Wiese, W.	Z. Astrophys. 44, 259-279 (1958).	emiss.
*Varsavsky, C. M.	Thesis Harvard (1958).	quant.
Aller, L. H. & Jugaku, J.	Astrophys. J. Suppl. Ser. 4, #38, 109-156 (1959).	CA
Bates, D. R.	"Physics of the Upper Atmosphere", 300-302 (ed. Ratcliffe, J. A., Academic Press, New York, 1960).	comm. forb.
Naqvi, A. M.	Geophysics Corporation of America Technical Report 61-21-A; ASTIA Document 263 459 (1961).	CA & comm. forb.

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*Stevenson, A. F.	Proc. Roy. Soc. London A 137, 298-325 (1932).	quant. forb.
*Condon, E. U.	Astrophys. J. 79, 217-234 (1934).	quant. forb.
Menzel, D. H. & Aller, L. H.	Astrophys. J. 94, 436-448 (1941).	quant.
Aller, L. H.	Astrophys. J. 97, 135-165 (1943).	quant.
Obi, S.	Publ. Astron. Soc. Japan 2, 150-155 (1950).	quant. forb., rel.
Garstang, R. H.	Monthly Notices Roy. Astron. Soc. 111, 115-124 (1951).	quant. forb.
Yamanouchi, T. & Horie, H.	J. Phys. Soc. Japan 7, 52-56 (1952).	quant. forb.
Yilmaz, H.	Phys. Rev. 100, 1148-1153 (1955).	quant. forb.
Bolotin, A. B., Levinson, I. B. & Levin, L. I.	Soviet Phys. - JETP 2, 391-395 (1956).	quant.
Bates, D. R.	"Physics of the Upper Atmosphere", 300-302 (ed. Ratcliffe, J. A., Academic Press, New York, 1960).	comm. forb.

O IV

AUTHOR	JOURNAL	CLASSIFICATION
Aller, L. H.	Astrophys. J. 97, 135-165 (1943).	quant.
Bolotin, A. B. & Yutsis, A. P.	Zhur. Eksptl. i Teoret. Fiz. 24, 537-543 (1953) (transl.).	SCF

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AUTHOR	JOURNAL	CLASSIFICATION
Aller, L. H.	Astrophys. J. 97, 135-165 (1943).	quant.
Bolotin, A. B. & Yutsis, A. P.	Zhur. Eksptl. i Teoret. Fiz. 24, 537-543 (1953) (transl.).	SCF

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AUTHOR	JOURNAL	CLASSIFICATION
Jugaku, J., Sargent, L. W. & Greenstein, J. L.	Astrophys. J. 134, 783-796 (1961).	CA

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AUTHOR	JOURNAL	CLASSIFICATION
Mrozowski, S.	Phys. Rev. 58, 1086-1093 (1940).	emiss. forb., rel.
Gerjuoy, E.	Phys. Rev. 60, 233-240 (1941).	quant. forb.
Jenkins, F. A. & Mrozowski, S.	Phys. Rev. 60, 225-233 (1941).	emiss. forb., rel.
Engler, H. D.	Z. Physik 144, 343-353 (1956).	absorpt.
Allen, C. W.	Monthly Notices Roy. Astron. Soc. 117, 622-628 (1957).	comm.
Allen, C. W. & Asaad, A. S.	Monthly Notices Roy. Astron. Soc. 117, 36-49 (1957) (see also above).	emiss.
Khokhlov, M. Z.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 21, 84-102 (1959) (transl.).	emiss.
Bell, G. D. & King, R. B.	Astron. J. 65, 483 (1960). [See also Astrophys. J. 133, 718-722 (1960).]	absorpt.
Khokhlov, M. Z.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 118-127 (1960) (transl.).	absorpt. & emiss.
Khokhlov, M. Z.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 128-133 (1960) (transl.).	incompl.
Bell, G. D. & King, R. B.	Astrophys. J. 133, 718-722 (1961).	absorpt.
Helliwell, T. M.	Astrophys. J. 133, 566-571 (1961).	quant.

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AUTHOR	JOURNAL	CLASSIFICATION
Bleeker, C. E.	Thesis Utrecht (1928).	emiss., rel.
Prokof'ev, V. K.	Z. Physik 57, 387-393 (1929). [Same as Zhur. Eksptl. i Teoret. Fiz. 1, 123-127 (1931).]	hook forb., rel.
Stevenson, A. F.	Proc. Roy. Soc. London A 128, 591-599 (1930).	quant. forb.
Prokof'ev, V. K.	Zhur. Eksptl. i Teoret. Fiz. 1, 123-127 (1931) (transl.). [Same as Z. Physik 57, 387-393 (1929).]	hook forb., rel.
Ornstein, L. S. & Key, J.	Physica 1, 945-952 (1934).	comm., rel.
Prokof'ev, V. K. & Shtandel, G.	Zhur. Eksptl. i Teoret. Fiz. 4, 359-367 (1934) (transl.).	hook, rel.
Heierman, J. H.	Thesis Utrecht (1937).	emiss.

AUTHOR	JOURNAL	CLASSIFICATION
Key, J.	Thesis Utrecht (1937).	emiss., rel.
Stephenson, G.	Nature 167, 112 (1951) (see also below).	misc.
Stephenson, G.	Proc. Phys. Soc. London A 64, 458-464 (1951).	misc.
Meyer-Berkhout, U.	Z. Physik 141, 185-197 (1955).	misc.
Yanoukh, F.	Vestnik Leningrad Univ. Ser. Fiz. i Khim. 10, 135-142 (1955) (transl.).	incompl.
Gol'dberg, G. I.	Pulkovo. Astronomicheskaia observatoriia. Izvestiia 20, 126-137 (1956) (transl.).	hook, rel.
Heavens, O. S.	J. Opt. Soc. Am. 51, 1058-1061 (1961).	CA
Naqvi, A. M.	Geophysics Corporation of America Technical Report 61-21-A; ASTIA Document 263 459 (1961).	CA

Rb II

Petersen, R.	Phys. & Chem. Solids 1, 284 (1957).	quant., rel.

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Rn II

Edlén, B.	Phys. Rev. 65, 248 (1948).	quant. forb.

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Ru I

Goldberg, L., Müller, E. A. & Aller, L. H.	Astrophys. J. Suppl. Ser. 5, #45, 1-137 (1960).	CA

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S I

Bowen, I. S.	Rev. Mod. Phys. 20, 109-112 (1948).	estim. forb.
Osterbrock, D. E.	Astrophys. J. 114, 469-472 (1951).	quant. forb.
Goldberg, L., Müller, E. A. & Aller, L. H.	Astrophys. J. Suppl. Ser. 5, #45, 1-137 (1960).	CA

S II

Condon, E. U.	Astrophys. J. 79, 217-234 (1934).	quant. forb.
Garstang, R. H.	Astrophys. J. 115, 506-508 (1952).	quant. forb.
Garstang, R. H.	Monthly Notices Roy. Astron. Soc. 114, 118-133 (1954).	quant., rel. & CA
Naqvi, A. M. & Talwar, S. P.	Monthly Notices Roy. Astron. Soc. 117, 463-471 (1957).	quant. forb.
Aller, L. H. & Jugaku, J.	Astrophys. J. Suppl. Ser. 4, #38, 109-156 (1959).	CA
Gaustad, J. E. & Spitzer, Jr., L.	Astrophys. J. 134, 771-776 (1961).	estim.

S III

Gaustad, J. E. & Spitzer, Jr., L.	Astrophys. J. 134, 771-776 (1961).	estim.

S IV

Gaustad, J. E. & Spitzer, Jr., L.	Astrophys. J. 134, 771-776 (1961).	estim.

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Sc I

AUTHOR	JOURNAL	CLASSIFICATION
Ostrovskii, Yu. I. & Penkin, N. P.	Optika i Spektroskopiya 3, 391-393 (1957) (transl.).	hook, rel.
Mitrofanova, L. A.	Pulkovo. Astronomicheskaia observatoriia. Izvestiia 21, #162, 159-161 (1958) (transl.).	emiss., rel.
Allen, C. W.	Monthly Notices Roy. Astron. Soc. 121, 299-332 (1960).	comm. & CA
Goldberg, L., Müller, E. A. & Aller, L. H.	Astrophys. J. Suppl. Ser. 5, #45, 1-137 (1960).	CA

Sc II

Wilson, O. C.	Astrophys. J. 107, 126-150 (1948).	misc., rel.
Aller, L. H., Hazen, M., Doherty, L., Grant, G., Jugaku, J., Spiegel, E. & Waddell, J.	Publications of the Observatory, Univ. of Michigan (Feb. 19, 1954).	misc., rel.
Mitrofanova, L. A.	Pulkovo. Astronomicheskaia observatoriia. Izvestiia 21, #162, 159-161 (1958) (transl.).	emiss., rel.
Boyarchuk, M. E. & Boyarchuk, A. A.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 234-256 (1960) (transl.).	comm.
Groth, H. G.	Z. Astrophys. 51, 231-285 (1961).	misc.

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Se II

Boyarchuk, M. E. & Boyarchuk, A. A.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 234-256 (1960). (transl.).	comm.

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Si I

Russell, H. N.	Astrophys. J. 78, 239-297 (1927).	estim.
Allen, C. W.	Monthly Notices Roy. Astron. Soc. 117, 622-628 (1957).	comm.
Allen, C. W. & Asaad, A. S.	Monthly Notices Roy. Astron. Soc. 117, 36-49 (1957) (see also above).	emiss.
Varsavsky, C. M.	Thesis Harvard (1958).	quant.
Addink, N. W. H.	Spectrochim. Acta 15, 349-359 (1959).	emiss.
Hey, P.	Z. Physik 157, 79-88 (1959).	emiss.
Boyarchuk, M. E. & Boyarchuk, A. A.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 234-256 (1960) (transl.).	comm.
Goldberg, L., Müller, E. A. & Aller, L. H.	Astrophys. J. Suppl. Ser. 5, #45, 1-137 (1960).	CA
Vidale, G. L.	ASTIA Document 239 281 (1960).	absorpt.

Si II

Russell, H. N.	Astrophys. J. 78, 239-297 (1927).	estim.
Biermann, L.	Nachr. Akad. Wiss. Göttingen Math.-physik. Kl. 116-118 (1946-1948). [See also Biermann, L. & Lübeck, K., Z. Astrophys. 25, 325-339 (1948).]	SCF
Bates, D. R. & Damgaard, A.	Astrophys. J. 107, 383-385 (1948).	SCF
Biermann, L. & Lübeck, K.	Z. Astrophys. 25, 325-339 (1948).	SCF
Aller, L. H., Hazen, M., Doherty, L., Grant, G., Jugaku, J., Spiegel, E. & Waddell, J.	Publications of the Observatory, Univ. of Michigan (Feb. 19, 1954).	misc., rel.

AUTHOR	JOURNAL	CLASSIFICATION
Varsavsky, C. M.	Thesis Harvard (1958).	quant.
Hey, P.	Z. Physik 157, 79-88 (1959).	emiss.
Boyarchuk, M. E. & Boyarchuk, A. A.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 234-256 (1960) (transl.).	comm.
Jugaku, J., Sargent, L. W. & Greenstein, J. L.	Astrophys. J. 134, 783-796 (1961).	CA

Si III

AUTHOR	JOURNAL	CLASSIFICATION
Russell, H. N.	Astrophys. J. 78, 239-297 (1927).	estim.
Aller, L. H. & Jugaku, J.	Astrophys. J. Suppl. Ser. 4, #38, 109-156 (1959).	CA
Gaustad, J. E. & Spitzer, Jr., L.	Astrophys. J. 134, 771-776 (1961).	comm. & estim.

Si IV

AUTHOR	JOURNAL	CLASSIFICATION
Russell, H. N.	Astrophys. J. 78, 239-297 (1927).	estim.
Rudkjobing, M.	Publications of the Copenhagen Observatory No. 145, 74-82 (1947).	quant.
Traving, G.	Z. Astrophys. 36, 1-41 (1955).	CA
Gaustad, J. E. & Spitzer, Jr., L.	Astrophys. J. 134, 771-776 (1961).	comm.
Houziaux, L. & Sadoine, M. P.	Bull. soc. roy. sci. Liège 30, 287-299 (1961).	CA
Douglas, A. S. & Garstang, R. H.	Submitted for publication, Proc. Cambridge Phil. Soc. (1962).	SCF

Si X

AUTHOR	JOURNAL	CLASSIFICATION
Garstang, R. H.	Submitted for publication, Ann. astrophys. (1962).	quant. forb.

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Sn I

AUTHOR	JOURNAL	CLASSIFICATION
Allen, C. W.	Monthly Notices Roy. Astron. Soc. 117, 622-628 (1957).	comm.
Allen, C. W. & Asaad, A. S.	Monthly Notices Roy. Astron. Soc. 117, 36-49 (1957) (see also above).	emiss.
Prokof'ev, V. K., Nagibina, I. M. & Petrova, G. P.	Optics & Spectroscopy (U.S.S.R.) 8, 195-197 (1960).	emiss.

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Sr I

AUTHOR	JOURNAL	CLASSIFICATION
Kerschbaum, H.	Ann. Physik 83, 287-295 (1927).	canal
Prokof'ev, V. K.	Z. Physik 50, 701-715 (1928) (same as below).	hook, rel.
Prokof'ev, V. K.	Zhur. Eksptl. i Teoret. Fiz. 1, 111-122 (1931) (transl.) (same as above).	hook, rel.
Kast, W.	Z. Physik 79, 731-735 (1932).	emiss., rel.
Chamalaun, F. J.	Thesis Utrecht (1934).	emiss., rel. & quant., rel.
King, G. W. & van Vleck, J. H.	Phys. Rev. 56, 464-465 (1939).	quant. forb., rel.
Schuttevaer, J. W.	Thesis Utrecht (1942) (see below for results).	emiss., rel.
Schuttevaer, J. W., de Bont, M. J. & van den Broek, Th. H.	Physica 10, 544-552 (1943).	emiss., rel.

AUTHOR	JOURNAL	CLASSIFICATION
Kruithof, A. M. & Smit, J. A.	Physica 11, 129-143 (1944) (transl.).	estim.
Eberhagen, A.	Z. Physik 143, 392-411 (1955).	emiss.
Mannkopff, R.	Experim. Techn. d. Physik. Sonderheft Spektroskopie 44-50 (1955).	comm.
Mitrofanova, L. A.	Pulkovo. Astronomicheskaia observatoriia. Izvestiia 20, #159, 52-54 (1958) (transl.).	emiss., rel.
Ostrovskii, Yu. I., Penkin, N. P. & Shabanova, L. N.	Bull. Acad. Sci. U.S.S.R. Phys. Ser. 22, 720-724 (1958) (results same as below). [See also Ostrovskii, Yu. I. & Penkin, N. P., Optics & Spectroscopy (U.S.S.R.) 11, 307-309 (1961).]	hook
Ostrovskii, Yu. I., Penkin, N. P. & Shabanova, L. N.	Soviet Phys. - Doklady 3, 538-540 (1958) (results same as above). [See also Ostrovskii, Yu. I. & Penkin, N. P., Optics & Spectroscopy (U.S.S.R.) 11, 307-309 (1961).]	hook
Addink, N. W. H.	Spectrochim. Acta 15, 349-359 (1959).	emiss.
Ostrovskii, Yu. I. & Penkin, N. P.	Optics and Spectroscopy (U.S.S.R.) 11, 307-309 (1961).	hook & comm.

Sr II

AUTHOR	JOURNAL	CLASSIFICATION
Kruithof, A. M. & Smit, J. A.	Physica 11, 129-143 (1944) (transl.).	estim.
Nikonova, E. I. & Prokof'ev, V. K.	Optika i Spektroskopiya 1, 290-297 (1956) (transl.).	hook, rel.
Dvornikova, I. U. & Nagibina, I. M.	Optika i Spektroskopiya 4, 421-429 (1958).	incompl.
Mitrofanova, L. A.	Pulkovo. Astronomicheskaia observatoriia. Izvestiia 20, #159, 52-54 (1958) (transl.).	emiss., rel.
Ostrovskii, Yu. I. & Penkin, N. P.	Optics and Spectroscopy (U.S.S.R.) 10, 3-6 (1961) (see also below).	hook
Ostrovskii, Yu. I. & Penkin, N. P.	Optics and Spectroscopy (U.S.S.R.) 11, 307-309 (1961).	comm.

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Ti I

AUTHOR	JOURNAL	CLASSIFICATION
Frerichs, R.	Ann. Physik 81, 807-845 (1926).	emiss., rel.
Harrison, G. R.	J. Opt. Soc. Am. 17, 389-416 (1928).	emiss., rel.
Harrison, G. R. & Engwicht, H.	J. Opt. Soc. Am. 18, 287-301 (1929).	emiss., rel.
King, R. B. & King, A. S.	Astrophys. J. 87, 24-39 (1938).	absorpt., rel.
van Stekelenburg, L. H. M.	Thesis Utrecht (1943). [See also van Stekelenburg, L. H. M., et al., Physica 14, 189-196 (1948) for results.]	emiss., rel.
Petrie, W.	Can. J. Research A 25, 42-48 (1947).	comm.
Rohrlich, F.	Phys. Rev. 74, 1381-1396 (1948).	quant.
van Stekelenburg, L. H. M. & Smit, J. A.	Physica 14, 189-196 (1948).	emiss., rel.
Mitrofanova, L. A.	Pulkovo. Astronomicheskaia observatoriia. Izvestiia 19, #153, 107-111 (1955) (transl.).	emiss., rel.
Ostrovskii, Yu. I., Parchevskii, G. F. & Penkin, N. P.	Optika i Spektroskopiya 1, 821-832 (1956) (transl.).	hook, rel.
Addink, N. W. H.	Spectrochim. Acta 15, 349-359 (1959).	emiss.
Allen, C. W.	Monthly Notices Roy. Astron. Soc. 121, 299-332 (1960).	comm. & CA
Boyarchuk, M. E. & Boyarchuk, A. A.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 234-256 (1960) (transl.).	comm.
Hefferlin, R., Cobb, B., Hall, D. & Lehman, C.	Astrophys. J. 132, 259-263 (1960).	emiss., rel.
Tatum, J. B.	Monthly Notices Roy. Astron. Soc. 122, 311-324 (1961).	emiss., rel.

Ti II

AUTHOR	JOURNAL	CLASSIFICATION
Harrison, G. R.	J. Opt. Soc. Am. 17, 389-416 (1928).	emiss., rel.
King, R. B.	Astrophys. J. 94, 27-29 (1941).	absorpt., rel.
van Stekelenburg, L. H. M.	Thesis Utrecht (1943). [See also van Stekelenburg, L. H. M. & Smit, J. A., Physica 14, 189-196 (1948) for results.]	emiss., rel.
Petrie, W.	Can. J. Research A 25, 42-48 (1947).	comm.
Wilson, O. C.	Astrophys. J. 107, 126-150 (1948).	misc., rel.
van Stekelenburg, L. H. M. & Smit, J. A.	Physica 14, 189-196 (1948).	emiss., rel.
Aller, L. H., Hazen, M., Doherty, L., Grant, G., Jugaku, J., Spiegel, E. & Waddell, J.	Publications of the Observatory, Univ. of Michigan (Feb. 19, 1954).	misc., rel.
Mitrofanova, L. A.	Pulkovo. Astronomicheskaia observatoriia. Izvestiia 19, #153, 107-111 (1955) (transl.).	emiss., rel.
Varsavsky, C. M.	Thesis Harvard (1958).	quant.
Boyarchuk, M. E. & Boyarchuk, A. A.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 234-256 (1960) (transl.).	comm.
Rountree, J. C.	Ann. astrophys. 23, 633-654 (1960) (transl.).	comm.
Houziaux, L. & Sadoine, M. P.	Bull. soc. roy. sci. Liège 30, 287-299 (1961).	CA
Tatum, J. B.	Monthly Notices Roy. Astron. Soc. 122, 311-324 (1961).	emiss., rel.

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Tl I

AUTHOR	JOURNAL	CLASSIFICATION
Kuhn, W.	Naturwissenschaften 13, 724-726 (1925) (see also below).	misc.
Kuhn, W.	Kgl. Danske Videnskab. Selskab Mat.-fys. Medd. 7, 1-86 (1926).	misc.
Prokof'ev, V. K. & Solov'ev, V. N.	Z. Physik 48, 276-285 (1928).	hook, rel.
Filippov, A. N. & Prokof'ev, V. K.	Z. Physik 85, 647-660 (1933). [Same as Zhur. Eksptl. i Teoret. Fiz. 4, 31-42 (1934).]	hook
Müller, F.	Helv. Phys. Acta 7, 488-491 (1934).	absorpt.
Müller, F.	Helv. Phys. Acta 7, 813-840 (1934).	absorpt.
Müller, F.	Helv. Phys. Acta 8, 152-164 (1935).	absorpt.
Prokof'ev, V. K. & Filippov, A. N.	Zhur. Eksptl. i Teoret. Fiz. 4, 31-42 (1934) (transl.). [Same as Z. Physik 85, 647-660 (1933).]	hook, rel.
Kvater, G. S.	Physik. Z. Sowjetunion 7, 226 (1935) (same as below).	hook, rel.
Kvater, G. S.	Zhur. Eksptl. i Teoret. Fiz. 5, 426-439 (1935) (transl.) (same as above).	hook, rel.
Kvater, G. S.	Zhur. Eksptl. i Teoret. Fiz. 11, 421-439 (1941). [Same as J. Phys. U.S.S.R. 6, 145-162 (1942); see also Vainshtein, L. A., Bull. Acad. Sci. U.S.S.R. Phys. Ser. 22, 668-699 (1958).]	hook
Kvater, G. S.	Zhur. Eksptl. i Teoret. Fiz. 11, 440-447 (1941). [Same as J. Phys. U.S.S.R. 6, 210-217 (1942).]	comm.
Kvater, G. S.	J. Phys. U.S.S.R. 6, 145-162 (1942). [Same as Zhur. Eksptl. i Teoret. Fiz. 11, 421-439 (1941).]	hook
Kvater, G. S.	J. Phys. U.S.S.R. 6, 210-217 (1942). [Same as Zhur. Eksptl. i Teoret. Fiz. 11, 440-447 (1941).]	comm.
Kvater, G. S.	Vestnik Leningrad Univ. Ser. Fiz. i Khim. No. 2, 135-141 (1947) (transl.).	incompl.
Stephenson, G.	Nature 167, 112 (1951) (see also below).	misc.
Stephenson, G.	Proc. Phys. Soc. London A 64, 458-464 (1951).	misc.
Marr, G. U.	Proc. Roy. Soc. London A 224, 83-90 (1954).	absorpt.

AUTHOR	JOURNAL	CLASSIFICATION
Nikonova, E. I. & Prokof'ev, V. K.	Optika i Spektroskopiya 1, 290-297 (1956) (transl.).	hook, rel.
Hinnov, E. & Kohn, H.	J. Opt. Soc. Am. 47, 156-162 (1957).	emiss.
Gurvich, L. V.	Optika i Spektroskopiya 5, 205-207 (1958) (transl.).	incompl.
Vainshtein, L. A.	Bull. Acad. Sci. U.S.S.R. Phys. Ser. 22, 668-669 (1958).	SCF & comm.
Brehm, B., Demtröder, W. & Osberghaus, O.	Z. Naturforsch. 16a, 843 (1961). [See also Demtröder, W., below and Z. Physik 166, 42-45 (1961).]	life
Demtröder, W.	Thesis Bonn (1961). [See Z. Physik 166, 42-45 (1962) for results.]	life
Hanus, W.	Bull. acad. polon. sci. Classe 3, 8, 629-636 (1961).	quant.
Tolans, E. L. & Lurio, A.	Bull. Am. Phys. Soc. (2) 6, 75 (1961).	misc.
Demtröder, W.	Z. Physik 166, 42-45 (1962).	life

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V I

Frerichs, R.	Ann. Physik 81, 807-845 (1926).	emiss., rel.
King, R. B.	Astrophys. J. 105, 376-389 (1947).	absorpt., rel.
Righini, G.	Mem. soc. astron. ital. 19-20, 303-311 (ed. Allen, C. W., University Press, Princeton, 1948-1949) (transl.).	misc., rel.
Ostrovskii, Yu. I. & Penkin, N. P.	Optika i Spektroskopiya 5, 345-353 (1958) (transl.).	hook, rel.
Addink, N. W. H.	Spectrochim. Acta 15, 349-359 (1959).	emiss.
Allen, C. W.	Monthly Notices Roy. Astron. Soc. 121, 299-332 (1960).	comm. & CA
Boyarchuk, M. E. & Boyarchuk, A. A.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 234-256 (1960) (transl.).	comm.

V II

Wilson, O. C.	Astrophys. J. 107, 126-150 (1948).	misc., rel.
Aller, L. H., Hazen, M., Doherty, L., Grant, G., Jugaku, J., Spiegel, E. & Waddell, J.	Publications of the Observatory, Univ. of Michigan (Feb. 19, 1954).	misc., rel.
Boyarchuk, M. E. & Boyarchuk, A. A.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 234-256 (1960) (transl.).	comm.
Groth, H. G.	Z. Astrophys. 51, 231-285 (1961).	misc.

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Xe I

Petersen, R.	Phys. & Chem. Solids 1, 284 (1957).	quant., rel.

Xe II

Edlén, B.	Phys. Rev. 65, 248 (1948).	quant. forb.

Xe III

Edlén, B.	Phys. Rev. 65, 248 (1948).	quant. forb.
Osterbrock, D. E.	Astrophys. J. 114, 469-472 (1951).	quant. forb.

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Y I

AUTHOR	JOURNAL	CLASSIFICATION
Goldberg, L., Müller, E. A. & Aller, L. H.	Astrophys. J. Suppl. Ser. 5, #45, 1-137 (1960).	CA

Y II

AUTHOR	JOURNAL	CLASSIFICATION
Boyarchuk, M. E. & Boyarchuk, A. A.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 234-256 (1960) (transl.).	comm., rel.

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Zn I

AUTHOR	JOURNAL	CLASSIFICATION
Russell, H. N.	Astrophys. J. 78, 239-297 (1927).	estim.
Prokof'ev, V. K.	Z. Physik 50, 701-715 (1928). [Same as Zhur. Eksptl. i Teoret. Fiz. 1, 111-122 (1931).]	estim.
Larché, K.	Z. Physik 67, 440-477 (1931).	misc., rel.
Prokof'ev, V. K.	Zhur. Eksptl. i Teoret. Fiz. 1, 111-122 (1931) (transl.). [Same as Z. Physik 50, 701-715 (1928).]	estim.
Filippov, A. N.	Physik. Z. Sowjetunion 1, 289-296 (1932) (same as below).	hook, rel.
Filippov, A. N.	Trudy Gosudarst. Opt. Inst. Leningrad 8, 1-8 (1932) (transl.) (same as above).	hook, rel.
Soleillet, P.	Compt. rend. 195, 372-373 (1932) (transl.).	misc.
Billeter, W.	Helv. Phys. Acta 7, 505-513 (1934).	absorpt.
Billeter, W.	Helv. Phys. Acta 7, 841-842 (1934).	comm.
Soleillet, P.	Compt. rend. 204, 253-255 (1937).	absorpt.
Ausländer, J.	Helv. Phys. Acta 11, 562-586 (1938).	absorpt.
Mason, R. C.	Physica 5, 777-783 (1938).	emiss., rel.
Bruck, H.	Compt. rend. 208, 1805-1807 (1939) (transl.).	misc.
King, G. W. & van Vleck, J. H.	Phys. Rev. 56, 464-465 (1939).	quant. forb., rel.
Bruck, H.	Thesis Paris (1942) (transl.).	misc.
Bruck, H.	Compt. rend. 214, 307-309 (1942) (transl.).	misc.
Schuttevaer, J. W.	Thesis Utrecht (1942). [See also below and Schuttevaer, J. W., et al., Physica 10, 544-552 (1943).]	emiss., rel.
Schuttevaer, J. W. & Smit, J. A.	Physica 10, 502-512 (1943) (see also below).	emiss., rel.
Schuttevaer, J. W., de Bont, M. J. & van der Broek, Th. H.	Physica 10, 544-552 (1943).	emiss., rel.
Spitzer, M.	Compt. rend. 239, 696-698 (1954) (transl.).	misc.
Geneux, E. & Wanders-Vincenz, B.	Helv. Phys. Acta 33, 185-220 (1960) (transl.).	misc.
May, A. D.	Compt. rend. 250, 3616-3617 (1960) (transl.).	misc.
May, A. D.	Compt. rend. 251, 1371-1372 (1960) (transl.).	misc.
Penkin, N. P. & Red'ko, T. P.	Optics and Spectroscopy (U.S.S.R.) 9, 360 (1960).	hook, rel. & emiss., rel.

Zn II

AUTHOR	JOURNAL	CLASSIFICATION
Russell, H. N.	Astrophys. J. 78, 239-297 (1927).	estim.
Bruck, H.	Compt. rend. 208, 1805-1807 (1939) (transl.).	misc.
Geneux, E. & Wanders-Vincenz, B.	Helv. Phys. Acta 33, 185-220 (1960) (transl.).	misc.

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AUTHOR	JOURNAL	CLASSIFICATION
	Zr I	
Goldberg, L., Müller, E. A. & Aller, L. H.	Astrophys. J. Suppl. Ser. 5, #45, 1-137 (1960).	CA
	Zr II	
Boyarchuk, M. E. & Boyarchuk, A. A.	Akademiia Nauk S.S.S.R. Krymskaia astrofizecheskaia observatoriia. Izvestiia 22, 234-256 (1960) (transl.).	comm., rel.
Houziaux, L. & Sadolne, M. P.	Bull. soc. roy. sci. Liège 30, 287-299 (1961).	CA

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4. PARTIAL LIST OF ABBREVIATIONS FOR JOURNALS

For convenience complete titles for the abbreviations of sparsely circulated journals are listed.

AEC-TR	Atomic Energy Commission English translation
Ann. astrophys.	Annales d'astrophysique
Arch. néerl. sci. 3A	Archives néerlandaises des sciences exactes et naturelles. Series 3A
ASTIA	Armed Services Technical Information Agency
Astron. Zhur.	Astronomicheskii Zhurnal
Soviet Astronomy-AJ	Astronomical Journal (English translation of above)
ATS (transl.)	English translation available from: Associated Technical Services, Inc. P. O. Box 271, East Orange, New Jersey
Bull. acad. polon. sci. Classe 3	Bulletin de l'académie polonaise des sciences. Classe 3
Bull. soc. roy. sci. Liège	Bulletin de la société royale des sciences de Liège
Compt. rend.	Academie des sciences, Paris. Comptes rendus
Doklady Akad. Nauk Armyan. S.S.R.	Doklady Akademii Nauk Armyanskoi. S.S.R.
Doklady Akad. Nauk S.S.S.R.	Doklady Akademii Nauk S.S.S.R.
Soviet Phys.-Doklady	Proceedings of the Academy of Sciences of the U.S.S.R. (English translation of above)
Ergeb. exakt. Naturw.	Ergebnisse der exakten Naturwissenschaften
Geofys. Publikasjoner Norske Videnskaps-Akad. i Oslo	Geofysiske Publikasjoner. Utgitt av det Norske Videnskaps-Akademi i Oslo
Izvest. Akad. Nauk S.S.S.R. Ser. Fiz.	Izvestiya Akademii Nauk S.S.S.R. Seriya Fizicheskaya
Bull. Acad. Sci. U.S.S.R. Phys. Ser.	Bulletin of the Academy of Science of the U.S.S.R. Physical Series (English translation of above)
J. Atmospheric and Terrest. Phys.	Journal of Atmospheric and Terrestial Physics
J. phys. radium	Journal de physique, Le, et Le radium
J. Phys. (U.S.S.R.)	Journal of Physics (Academy of Sciences of the U.S.S.R.) (in English)
J. Tenn. Acad. Sci.	Journal of the Tennessee Academy of Science
Kgl. Danske Videnskab. Selskab Mat.-fys. Medd.	Kongelige Danske Videnskabernes Selskab, Det, Mathematisk-fysiske Meddelelser
Kgl. Norske Videnskab. Selskabs, Skrifter	Kongelige Norske Videnskabers Selskabs, Det, Skrifter
Mem. soc. astron. ital.	Memorie della società astronomica italiana
Mém. soc. roy. sci. Liège	Mémoires de la société royale des sciences de Liège
Münch. tierärztl. Wochschr.	Münchener tierärztliche Wochenschrift
Nachr. Akad. Wiss. Göttingen, Math.-physik. Kl.	Nachrichten der Akademie der Wissenschaften in Göttingen, Mathematisch-physikalische Klasse
Optika i Spektroskopiya	(no abbreviation)
Optics and Spectroscopy (U.S.S.R.)	(no abbreviation) (English translation of above)
Sitzber. deut. Akad. Wiss. Berlin, Kl. Math., Phys. u Tech.	Sitzungsberichte der deutschen Akademie der Wissenschaften zu Berlin, Klasse für Mathematik, Physik und Technik
Sitzber. math.-physik. Kl. bayer. Akad. Wiss. München	Sitzungsberichte der mathematisch-physikalischen Klasse der bayerischen Akademie der Wissenschaften zu München
SLA-RT	English translation available from: SLA Translation Monthly, The John Crerar Library, 86 East Randolph St., Chicago, Illinois
Trudy Gosudarst. Opt. Inst. Leningrad	Trudy Gosudarstvennogo Opticheskogo Instituta, Leningrad
Uspekhi Fiz. Nauk	Uspekhi Fizicheskikh Nauk
Verhandl. deut. physik. Ges.	Verhandlungen der deutschen physikalischen Gesellschaft
Z. Elektrochem.	Zeitschrift für Elektrochemie
Z. physik. Chem.	Zeitschrift für physikalische Chemie (Leipzig)
Zhur. Eksptl. i Teoret. Fiz.	Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki
Soviet Phys.-JETP	Journal of Experimental and Theoretical Physics (English translation of above)

Selected Publications of the National Bureau of Standards

Atomic Energy Levels, C. E. Moore:

Circular 467, Volume I. H to V (Z=1 to 23) 206 spectra. 309 p. (1949)	$5.50
Circular 467, Volume II. Cr to Nb (Z=24 to 41) 152 spectra. 227 p. (1952)	$4.00
Circular 467, Volume III. Mo to La (Z=42 to 57) Hf to Ac (Z=72 to 89) 124 spectra. 245 p. (1958)	$2.50

An Ultraviolet Multiplet Table, C. E. Moore:

Circular 488, Section 1. H to V (Z=1 to 23); Selected Multiplets of 79 Spectra. 78 p. (1950).	$0.55
Circular 488, Section 2. Cr to Nb (Z=24 to 41); Selected Multiplets of 46 Spectra. 115 p. (1952).	$0.70
Circular 488, Section 3. Mo to La (Z=42 to 57) Hf to Ra (Z=72 to 88) Selected Multiplets of 78 Spectra. 94 p. (1961).	$0.60
Circular 488, Section 4. H to Nb (Z=1 to 41); Finding List for Sections 1 and 2 of the Table. 65 p. (1961).	$0.45
Circular 488, Section 5. Mo to La (Z=42 to 57) Hf to Ra (Z=72 to 88) Finding List for Section 3 of the Table. 30 p. (1961).	$0.30

Table of Wavenumbers, C. D. Coleman, W. R. Bozman, and W. F. Meggers:

Monograph 3, Volume I. 2000 A to 7000 A. 508 p. (1960)	$6.00
Monograph 3, Volume II. 7000 A to 1000 μ. 542 p. (1960)	$6.00

New Description of Thorium Spectra, Romuald Zalubas:

Monograph 17, 106 p. (1960)	$0.65

Tables of Spectral-Line Intensities, W. F. Meggers, C. H. Corliss, and B. F. Scribner:

Monograph 32, Part I. Arranged by Elements. 474 p. (1961)	$4.00
Monograph 32, Part II. Arranged by Wavelengths. 272 p. (1961)	$3.00

The above publications may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

A Multiplet Table of Astrophysical Interest, C. E. Moore. A Reprinting of the 1945 Multiplet Table (Princeton Univ., Obs. Contr. No. 20):

Technical Note 36 (PB151395), Part I Table of Multiplets, and Part II Finding List, λλ2951Å–13164Å. 242 p. (1959).	$4.00

The above Technical Note may be purchased by the PB number from the Department of Commerce, Office of Technical Services, Washington 25, D.C.

U. S. GOVERNMENT PRINTING OFFICE : 1962 O - 635684

U.S. Department of Commerce,
Luther H. Hodges, *Secretary.*

National Bureau of Standards,
A. V. Astin, *Director.*

THE NATIONAL BUREAU OF STANDARDS

The scope of activities of the National Bureau of Standards at its major laboratories in Washington, D.C., and Boulder, Colorado, is suggested in the following listing of the divisions and sections engaged in technical work. In general, each section carries out specialized research, development, and engineering in the field indicated by its title. A brief description of the activities, and of the resultant publications, appears on the inside of the front cover.

WASHINGTON, D.C.

Electricity. Resistance and Reactance. Electrochemistry. Electrical Instruments. Magnetic Measurements. Dielectrics. High Voltage.
Metrology. Photometry and Colorimetry. Refractometry. Photographic Research. Length. Engineering Metrology. Mass and Scale. Volumetry and Densimetry.
Heat. Temperature Physics. Heat Measurements. Cryogenic Physics. Equation of State. Statistical Physics.
Radiation Physics. X-ray. Radioactivity. Radiation Theory. High Energy Radiation. Radiological Equipment. Nucleonic Instrumentation. Neutron Physics.
Analytical and Inorganic Chemistry. Pure Substances. Spectrochemistry. Solution Chemistry. Standard Reference Materials. Applied Analytical Research. Crystal Chemistry.
Mechanics. Sound. Pressure and Vacuum. Fluid Mechanics. Engineering Mechanics. Rheology. Combustion Controls.
Polymers. Macromolecules: Synthesis and Structure. Polymer Chemistry. Polymer Physics. Polymer Characterization. Polymer Evaluation and Testing. Applied Polymer Standards and Research. Dental Research.
Metallurgy. Engineering Metallurgy. Microscopy and Diffraction. Metal Reactions. Metal Physics. Electrolysis and Metal Deposition.
Inorganic Solids. Engineering Ceramics. Glass. Solid State Chemistry. Crystal Growth. Physical Properties. Crystallography.
Building Research. Structural Engineering. Fire Research. Mechanical Systems. Organic Building Materials. Codes and Safety Standards. Heat Transfer. Inorganic Building Materials. Metallic Building Materials.
Applied Mathematics. Numerical Analysis. Computation. Statistical Engineering. Mathematical Physics. Operations Research.
Data Processing Systems. Components and Techniques. Computer Technology. Measurements Automation. Engineering Applications. Systems Analysis.
Atomic Physics. Spectroscopy. Infrared Spectroscopy. Solid State Physics. Electron Physics. Atomic Physics.
Instrumentation. Engineering Electronics. Electron Devices. Electronic Instrumentation. Mechanical Instruments. Basic Instrumentation.
Physical Chemistry. Thermochemistry. Surface Chemistry. Organic Chemistry. Molecular Spectroscopy. Molecular Kinetics. Mass Spectrometry.
Office of Weights and Measures.

BOULDER, COLO.

Cryogenic Engineering Laboratory. Cryogenic Equipment. Cryogenic Processes. Properties of Materials. Cryogenic Technical Services.

CENTRAL RADIO PROPAGATION LABORATORY

Ionosphere Research and Propagation. Low Frequency and Very Low Frequency Research. Ionosphere Research. Prediction Services. Sun-Earth Relationships. Field Engineering. Radio Warning Services. Vertical Soundings Research.
Radio Propagation Engineering. Data Reduction Instrumentation. Radio Noise. Tropospheric Measurements. Tropospheric Analysis. Propagation-Terrain Effects. Radio-Meteorology. Lower Atmosphere Physics.
Radio Systems. Applied Electromagnetic Theory. High Frequency and Very High Frequency Research. Modulation Research. Antenna Research. Navigation Systems.
Upper Atmosphere and Space Physics. Upper Atmosphere and Plasma Physics. Ionosphere and Exosphere Scatter. Airglow and Aurora. Ionospheric Radio Astronomy.

RADIO STANDARDS LABORATORY

Radio Physics. Radio Broadcast Service. Radio and Microwave Materials. Atomic Frequency and Time-Interval Standards. Millimeter-Wave Research.
Circuit Standards. High Frequency Electrical Standards. Microwave Circuit Standards. Electronic Calibration Center.